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CALENDAR.

Monday, August 7.—Undergraduate **Applications for Admission,** and recommendations issued by the principals of accredited schools, should be filed with the Recorder of the Faculties on or before this date. This may be done by mail.

Friday-Tuesday, August 11-15.—Matriculation Examinations, in Harmon Gymnasium, Berkeley, for the Academic Colleges, Hastings College of the Law, and the Medical Department. Application for *examination permits* must be made to the Recorder of the Faculties not later than August 10; *for permits to be sent by mail,* not later than August 6. Filing of applications for admission to graduate and to special standing.

Wednesday and Thursday, August 16 and 17.—Professors and Instructors will keep **office-hours** for consultation with students and applicants.

[Gymnasium fee of $3.00 must be paid by all undergraduates before registration.]

Thursday, August 17, from 9:00 a.m. to 5:00 p.m.—Registration Day.—At the Gymnasium: Registration of graduate and upper-class students for courses of the first half-year. Students who elect courses beginning on Thursday afternoon must register before 1:00 o'clock p.m. Registration of upper-class students after Thursday will be permitted only in cases where the students have been granted leave of absence by the proper Faculty or Dean. All officers of instruction will keep **office hours** on the morning of Registration Day, from 9:30 until 12:00; and on the afternoon of that day, at such times as they may announce.

Thursday, August 17, 1:00 p.m.—Instruction in upper classes begins. Students must obtain the Recorder's Certificate of Registration in time to appear for enrollment by the instructor at the first meeting in each of the courses.

Monday, August 21.—Organization of Instruction for Freshmen.

8:30-11:15, in California Hall: Admission cards issued to intrants, and intrants pay the Gymnasium fee and register for the first half-year.

11:15 a.m., in the Gymnasium: Intrants assemble to meet the President, the Deans, and the Freshman Instructors and advisers.

1:30-4:30, in the Gymnasium and Hearst Hall: Examination for intrants in Matriculation Subject A.

Before filing their registration cards for the first half-year, intrants should provide themselves with the following publications: (1) REGISTER for 1904-05, (2) ANNOUNCEMENT OF COURSES [for sale by Students' Coöperative Society, ten cents; will be mailed by the Recorder on receipt of ten cents in stamps], (3) SCHEDULE OF EXERCISES, (4) REGISTRA[illegible], (5) CIRCULAR OF INFORMATION FOR FRESHMEN, [illegible] should consult their advisers before registering.

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UNIVERSITY OF CALIFORNIA

ANNOUNCEMENT

OF

COURSES OF INSTRUCTION

IN THE COLLEGES OF LETTERS, SOCIAL SCIENCES, NATURAL SCIENCES, COMMERCE, AGRICULTURE, MECHANICS, MINING, CIVIL ENGINEERING, AND CHEMISTRY,

FOR THE ACADEMIC YEAR, 1905-1906

BERKELEY
The University Press
1905.

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COURSES OF INSTRUCTION OFFERED IN THE COLLEGES AT BERKELEY FOR THE ACADEMIC YEAR, 1905-06.

PHILOSOPHY.

GEORGE H. HOWISON, M.A., LL.D., Mills Professor of Intellectual and Moral Philosophy and Civil Polity.

CHARLES H. RIEBER, Ph.D., Associate Professor of Logic, on the Mills Foundation.

HARRY A. OVERSTREET, A.B., B.Sc.(Oxon.), Assistant Professor of Philosophy, on the Mills Foundation.

FRANK S. WRINCH, Ph.D., Instructor in Psychology, on the Mills Foundation, with Charge of the Laboratory.

KNIGHT DUNLAP, Ph.D., Instructor in Psychology.

WARNER BROWN, M.A., Assistant in the Psychological Laboratory.

JAY W. HUDSON, Assistant in Philosophy.

GROUPING UNDER THE OLD PLAN OF STUDIES.

In combining Philosophy with other subjects to form a Group Elective, not fewer than 12 units in Philosophy are permissible. Courses 1, 2, 11, 15, and 20 cannot form part of any Group Elective. All courses but 11, 15, and 20 may be taken as Free Electives, subject to the prerequisite for each.

Teachers' Courses. Courses 1, 2, 3, 4, 6, 13, 24, 26, and 27 are especially valuable for teachers, actual or prospective.

LOWER DIVISION COURSES.

Although these courses properly fall within the first two years of undergraduate work, and are prerequisite to Upper Division Courses, they are open as Free Electives to any student in the University.

California University 12-5-19

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1. **Formal Logic.** Associate Professor RIEBER.

With especial reference to practice on division, definition, the forms and transformations of judgments, the syllogism, deductive and inductive, and fallacies.

3 hrs., either half-year. M W F. In three sections. Section I, 8; Section II, 1; Section III, 2.

2. **General Psychology.**

Professor HOWISON, Dr. WRINCH and Dr. DUNLAP.

The facts of consciousness, their classification and analysis, and their relations to the nervous system; with demonstrations in brain anatomy and in psychological experiment. The nature of personal identity, as the ground of the connection between mind and body.

3 hrs., either half-year. In four sections. Professor HOWISON: lecture to all sections, M, 3. Dr. WRINCH: Section I, W F, 3; Section III, W F, 9. Dr. DUNLAP: Section II, W F, 3; Section IV, Tu Th, 8. In the case of candidates for the Teacher's Certificate, Course 24, Course 3A, or Course 3B (the latter preferably to 3A), must accompany or follow this course; for others taking it, this combination is advised, but not required.

4. **Ethics, Theoretical and Practical.**

Professor HOWISON and Assistant Professor OVERSTREET.

A general introduction to the subject, including a history and criticism, in outline, of the leading ethical theories, followed by an application of results to the settlement of the more important questions of right and wrong in detail; lectures, with reading of the principal ethical classics.

2 hrs., throughout the year. Tu Th, 9, with additional Conferences, in sections. First half-year, Theoretical Ethics, Professor HOWISON, assisted by Mr. HUDSON, in charge of the sections; second half-year, Practical Ethics, Assistant Professor OVERSTREET.

UPPER DIVISION COURSES.

3A. **History of Classical and Middle Age Philosophy.**

Assistant Professor OVERSTREET.

Critical account of Greek, Roman, and Scholastic Philosophy, in outline.

3 hrs., first half-year. M W F, 10. In addition, the class will be sectioned for Conferences. Prerequisite: One of the Lower Division Courses.

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3B. **History of Modern Philosophy.**

Professor HOWISON, assisted by Mr. HUDSON.

Critical account, in outline, of Modern Thought from Descartes to the present time.

3 hrs., second half-year. M W F, 10. In addition, the class will be sectioned for Conferences, in charge of Mr. HUDSON. Prerequisite: Same as for Course 3A, and with strong recommendation that 3A shall also have been taken.

5. **The Philosophy of Kant.** Professor HOWISON.

The cardinal distinctions and doctrines of the system expounded and criticized.

2 hrs., throughout the year. Tu Th, 11. Prerequisite: Courses 1, 3A and 3B. (Courses 23 and 26 are advised as accompaniment.)

6. **Introduction to Psychological Experiment.**

Dr. WRINCH and Dr. DUNLAP.

Demonstration of characteristic groups of experiments, with individual practice in the use of psychological apparatus.

4 hrs.—2 units—each half-year, throughout the year. First half-year, Dr. WRINCH; second half-year, Dr. DUNLAP. Tu Th, 1 to 3. Prerequisite: Course 2; with its alternative adjuncts, in the case of candidates for the Teacher's Certificate.

10. **Theory of Scientific Method.**

Associate Professor RIEBER.

Based on a study of the standard writings on Induction, with the aim of attaining a critical philosophy of the methods of observational and experimental science.

2 hrs., throughout the year. Tu Th, 2. Prerequisite: Course 1. (Courses 2, 3A, 3B, and 13 would form valuable auxiliaries.)

*13. **Psychological Conference.** Dr. WRINCH.

Discussion of selected topics in psychology, in their historical setting, and as treated by writers of the present day.

2 hrs., consecutive, second half-year. Prerequisite: Courses 3B (or 3A; preferably, both) and 6. (It would be advantageous to have Course 4 also precede.

*Not to be given in 1905-06.

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16. **Plato and Aristotle.** Assistant Professor OVERSTREET.

Introduction to their systems by a comparative study.

2 hrs., throughout the year. Tu Th, 10. Prerequisite: Courses 1, 3A, and 4. A good reading knowledge of Greek, and familiarity with Latin, and with German or French, is desirable, though not for the present required. (This course may be counted as Group Elective in Greek, by students reading Plato and Aristotle in the original.)

*17. **Scholastic Philosophy.** Assistant Professor OVERSTREET.

A critical study of Middle Age thought, with especial reference to the systems of Aquinas and Scotus.

2 hrs., throughout the year. Prerequisite: Courses 1, 3A, and 4; Course 16, as accompaniment, if not previously completed. (Familiarity with Latin, Greek, and German or French, is an important adjunct, but is not for the present required.)

21. **English Philosophy from Hobbes to Spencer.** Assistant Professor OVERSTREET.

A critical study of the development of empiricism.

3 hrs., first half-year. M W F, 9. Prerequisite: Courses 1, 3A, and 3B.

23. **German Idealism after Kant: The Philosophy of Fichte, Schelling, and Hegel.** Assistant Professor OVERSTREET.

A study of the development of the Kantian philosophy in Germany, with especial reference to the system of Hegel.

3 hrs., second half-year. M W F, 9. Prerequisite: Courses 1, 3A and 3B. (A reading knowledge of German is important for this course, and students are advised to combine Course 5 with it.)

24. **History of Psychology.** Dr. DUNLAP.

Critical account of psychological theory and method, from Aristotle to the present time.

3 hrs., either half-year. M W F, 8. Prerequisite: Course 2.

25. **The Psychology of Sensation.** Dr. DUNLAP.

A study of the physiological and psychological action, both normal and abnormal, of the various senses; and of the characteristics and relationships of sensation in general.

2 hrs., throughout the year. Tu Th, 11. Prerequisite: Course 2.

*Not to be given in 1905-06.

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26. **Advanced Ethics, including Civil Polity.** Professor HOWISON.

Detailed critical discussion of the main problems of ethics, with critical essays by the class upon the ethical systems of leading philosophers and the chief ethical problems; investigation of the nature of a State, and of its bearing on the limits of liberty and allegiance; criticism of the leading political theories.

3 hrs., throughout the year. M W F, 9. Prerequisite: Courses 3A, 3B, and 4.

27. **The Psychology of Aesthetics.** Dr. WRINCH.

A lecture course attempting the systematic investigation of the subject.

2 hrs., second half-year. Hours to be arranged. Prerequisite: Same as for Course 13.

GRADUATE COURSES.

Of the foregoing Upper Division Courses, the following may rank as Graduate Courses: 5, 10, 16, 17, 21, 23, 25, 26, and 27, though intended primarily for undergraduates. The following are primarily for graduates, though qualified undergraduates may be admitted to them:

11. **Theory of Knowledge: Logic as the Method of Truth.** Associate Professor RIEBER.

Based on a study of the logical doctrines of Plato and Aristotle, Spinoza and Leibnitz, Fichte and Hegel, Lotze, Bradley, and Bosanquet; development and criticism of the leading theories of knowledge, aiming at a constructive result.

2 hrs., throughout the year. Prerequisite: Courses 5 and 23. Hours to be arranged.

15. **Psychological Research.** Dr. WRINCH and Dr. DUNLAP.

The working out, by the methods of the laboratory, of special problems assigned individually for original investigation.

Not less than 9 hrs., throughout the year—3 units each half-year; but at least 15 hrs.—5 units each half-year—recommended. Units and hours arranged with each student, at times within M Tu W Th F, 1-4. Prerequisite: Course 6, or its equivalent; permission to elect the course, obtained from the officer in charge of the laboratory.

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20. **Philosophical Seminary.** The DEPARTMENT STAFF.

Topics changed from year to year, upon conference among the teaching members, some one of whom will be made director for each year. Subject for 1905-06: Fundamental Problems in Logic:—The Import of Judgment, with special reference to its uses in estimating the principle of Pragmatism. Director, Professor HOWISON.

2 hrs., throughout the year. Tu, 3-5. Prerequisite: A good reading knowledge of all the languages necessary for a first-hand study of texts, and thorough acquaintance with the subjects of Courses 1-5, 10, 11, 16, 17, 21-24, and 26; permission to join the seminary, obtained from the director after conference.

In addition to these, special lines of study will be arranged for qualified graduates who are candidates for higher degrees, or who wish to carry on advanced work.

COURSES IN OTHER DEPARTMENTS.

The Theory of Education. [See Education 5.] Professor BROWN.

Elementary Law and Jurisprudence. Mr. DORETY.
[See Jurisprudence 10.]

Government. [See Political Science 1 and 2.] Professor MOSES.

History of Political Theories. Professor MOSES.
[See Political Science 3.]

Principles of Economics. [See Economics 2.] Professor MILLER.

Economic Origins. Assistant Professor MITCHELL.
[See Economics 40.]

Contemporary Socialism. [See Economics 42.] Dr. PEIXOTTO.

Plato. [See Greek 25 and 51.] Professor CLAPP.

Lucretius. [See Latin 25B.] Dr. BASORE.

Cicero: Tusculan Disputations. Assistant Professor NUTTING.
[See Latin 51.]

The Theory of Poetry. [See English 9A.] Professor GAYLEY.

The History of Aesthetic. [See English 40.] Professor GAYLEY.

The Principles of Literature. Professor GAYLEY.
[See English 54.]

The Principles of Dramaturgy: Lessing's Hamburgische Dramaturgie and the Theories of the Present Day. Professor PUTZKER.
[See German 25.]

Logic of Mathematics. Professor STRINGHAM.
[See Mathematics 18.]

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EDUCATION.

ELMER E. BROWN, Ph.D., Professor of the Theory and Practice of Education.

FLETCHER B. DRESSLAR, Ph.D., Associate Professor of the Science and Art of Teaching.

W. SCOTT THOMAS, A.B., Examiner of Schools and Assistant Professor of Education.

*ERNEST C. MOORE, LL.B., Ph.D., Assistant Professor of Education.

FREDERIC ERNEST FARRINGTON, Ph.D., Assistant Professor of Education.

THOMAS L. HEATON, B.L., LL.B., Lecturer in Education.

It is the purpose of the courses in Education to afford such instruction in the principles and the history of education as is desirable in a truly liberal culture, and to provide adequate professional preparation for University students who intend to teach. The undergraduate courses are reserved for the third and fourth years of college residence. Philosophy 2 (General Psychology) is a prerequisite of all courses in Education. Philosophy 4 (Ethics, Theoretical and Practical) should be taken by all students who can take it, and will be made a prerequisite of several courses in Education two years hence. Philosophy 1 (Formal Logic) is also a desirable preliminary course. See announcement of these courses, under Philosophy.

The Group Elective. Eighteen units of the Group Elective in Education must be taken in the Department of Education. The remaining six units may be chosen from courses in the Department of Education, or in the Department of Philosophy, or in both. Not more than four units of the six may be taken in a pedagogical course in some other department in which the student is to receive the recommendation for a teacher's certificate. Students may also make the Group Elective in Philosophy and Education together, subject to the limitation indicated by the Department of Philosophy.

The above paragraph does not apply to students graduating according to the revised scheme.

*Absent on leave, 1905-06.

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Courses in Other Departments. Courses of especial interest and value to teachers are offered in several departments of the University. Attention is called to the announcement of such courses in Philosophy, History, Political Science, Economics, Linguistics, Greek, Latin, English, German, Mathematics, Physics, Geography, Chemistry, Zoology, and Physical Culture. The University Extension courses and the courses in the Summer Session are usually of like interest and value to teachers.

Teachers' Certificates. For the conditions under which Recommendations for Teachers' Certificates are issued, see Joint Regulations of the Faculties, in the REGISTER.

UPPER DIVISION COURSES.

*3. **The History of Education: Earlier Periods.** (G.E.)
Assistant Professor MOORE.
3 hrs., first half-year. M W F, 3.

*4. **The History of Education: Later Periods.** (G.E.)
Assistant Professor MOORE.
3 hrs., second half-year. M W F, 3.

5. **The Theory of Education.** (G.E.) Professor BROWN.
Lectures, discussions, and readings.
3 hrs., first half-year. M W F, 10.

10A. **Introduction to Pedagogy.** (G.E.)
Associate Professor DRESSLAR.
Lectures, discussions, and readings.
3 hrs., first half-year. M W F, 9.

16. **Selected Topics in the Theory and Practice of Education.** (G.E.)
Associate Professor DRESSLAR.
Lectures and readings.
2 hrs., second half-year. Tu Th, 9. Prerequisite: At least Senior standing; Course 5 or 10A.

*17. **The Educational Theory of Herbart.** (G.E.)
Assistant Professor MOORE.
Lectures and readings.
2 hrs., first half-year. Tu Th, 3.

*18. **Studies in Educational Method.** (G.E.)
Assistant Professor MOORE.
Lectures and readings.
2 hrs., second half-year. Tu Th, 3.

*Not to be given in 1905-06.

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20. **The History of American Education.** (G.E.)
Professor BROWN.

Lectures and readings.

3 hrs., second half-year. M W F, 10.

24. **The History of Education: Sources.** (G.E.)
Assistant Professor MOORE.

2 hrs., second half-year. Tu Th, 3. Prerequisite: Course 3 or 4.

GRADUATE COURSES.

1A. **The Practice of Teaching.** Assistant Professor FARRINGTON.

Lectures and readings three hours a week, together with school observation or practice of teaching, under the direction of the instructor.

4 or 5 hrs., first half-year. Tu, 4; S, 8-10. Prerequisite: Three courses in the Department of Education. Students are advised to take course 3 or 4 or 20, and course 5 or 10A or 18, in partial satisfaction of this requirement. Admission only on consultation with the instructor in charge.

1B. **The Practice of Teaching.** Assistant Professor FARRINGTON.

Lectures and readings three hours a week, together with school observation or practice of teaching, under the direction of the instructor.

4 or 5 hrs., second half-year. Tu, 4; S, 8-10. Prerequisite: Three courses in the Department of Education. Students are advised to take course 3 or 4 or 20, and course 5 or 10A or 18, in partial satisfaction of this requirement. Admission only on consultation with the instructor in charge.

2A. **School Supervision.** Associate Professor DRESSLAR.

Seminary for the study of problems in the organization, grading, and management of schools; intended especially for those who are preparing to become school principals or superintendents.

2 hrs., first half-year. S, 8-10. Admission only on consultation with the instructor in charge.

6. **School Systems.** Assistant Professor THOMAS.

Lectures and readings.

2 hrs., second half-year. Tu Th, 10.

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7A. **Seminary for the Study of Special Problems in Education.**
Professor BROWN.

2 hrs., first half-year. S, 10-12. Open to a limited number of students.

7B. **Seminary for the Study of Special Problems in Education.**
Professor BROWN.

2 hrs., second half-year. S, 10-12. Open to a limited number of students. 7B may be elected in addition to 7A without repetition of subject-matter. 7A or 7B may be elected separately.

11A. **Seminary for the Study of Children.**
Associate Professor DRESSLAR.

2 hrs., first half-year. Th, 3-5.

11B. **Seminary for the Study of Children.**
Associate Professor DRESSLAR.

2 hrs., second half-year. Th, 3-5. 11B may be elected in addition to 11A without repetition of subject-matter.

12. **School Hygiene.** Associate Professor DRESSLAR.

Lectures and readings.

2 hrs., second half-year. Tu Th, 8.

*13A. **Studies in Secondary Education.** Professor BROWN.

Lectures and readings.

3 hrs., second half-year. Prerequisite: Course 5 or 20. Open also to graduates of state normal schools.

*13B. **Visitation of Secondary Schools.**
Assistant Professor THOMAS.

Conferences and readings, one hour a week, together with school visitation one-half day a week, under the direction of the instructor.

2 hrs., second half-year. Prerequisite: Three courses in the Department of Education. Admission only on consultation with the instructor in charge.

15. **Special Studies.** Professor BROWN, Associate Professor DRESSLAR, and Assistant Professor MOORE.

Credit value, hours, and topics to be arranged with individual students.

19A. **Seminary for the Study of Mental Development.**
Assistant Professor MOORE.

2 hrs., first half-year. Tu Th, 2.

*Not to be given in 1905-06.

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19B. **Seminary for the Study of Mental Development.**
Assistant Professor MOORE.
2 hrs., second half-year. Tu Th, 2. Prerequisite: Course 19A.

21. **The High School.** Assistant Professor THOMAS.
Lectures and readings, three hours a week, together with the observation of teaching in high schools, under the direction of the instructor.
4 hrs., second half-year. M W F, 4. Prerequisite: Three courses in the Department of Education. Open also to graduates of state normal schools. Admission only on consultation with the instructor in charge.

22A. **The Grammar School Principal.** Mr. HEATON.
A study of the functions of the principal as supervisor of class teaching. Topics: General method; the specific value, aim, and method of each of the several subjects taught in elementary schools. Intended especially for principals and teachers in active service and for those preparing to become principals of public grammar schools. Lectures and readings.
2 hrs., first half-year. S, 10-12. Prerequisite: Three courses in the Department of Education (or graduation from a state normal school or two years of experience in teaching). Admission only on consultation with the instructor in charge.

22B. **The Grammar School Principal.** Mr. HEATON.
A study of the functions of the principal as administrator. Topics: Organization, discipline, grading, promotion, individual teaching, ungraded room, departmental work, incentives, social activities of the school. Intended especially for principals and teachers in active service and for those preparing to become principals of public grammar schools. Lectures and readings.
2 hrs., second half-year. S, 10-12. Prerequisite: Three courses in the Department of Education (or graduation from a State normal school or two years of experience in teaching). Admission only on consultation with the instructor in charge.

23. **Methods in European Schools.**
Lectures and readings. Associate Professor DRESSLAR.
1 hr., second half-year. S, 9. Prerequisite: Course 5 or 10A.

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JURISPRUDENCE.

WILLIAM CAREY JONES, M.A., Professor of Jurisprudence.

CURTIS H. LINDLEY, Honorary Professor of the Law of Mines and Water.

GEORGE H. BOKE, M.A., Associate Professor of Jurisprudence.

ORRIN K. MCMURRAY, Ph.B., LL.B., Associate Professor of Jurisprudence.

FREDERIC G. DORETY, B.L., LL.B., Instructor in Law.

LOUIS T. HENGSTLER, M.A., Ph.D., Lecturer in Law.

WARREN OLNEY, Jr., A.B., LL.B., Lecturer in Law.

LESTER H. JACOBS, Ph.B., LL.B., Lecturer on the Law of Insurance.

Besides theoretical and historical courses in law, this department aims to give a thorough legal training. A three years' professional curriculum is organized, leading to the degree of Doctor of Law *(Juris Doctor)*. Only graduates or students who have had three years of college work are admitted as regular students, candidates for this degree. The first year of this curriculum may be taken as the fourth year of undergraduate work, enabling the student to obtain both the academic degree and the legal degree in six years. A dissertation on some legal topic will be required of candidates for the degree of Doctor of Law (J.D.)

LIBRARY.

A valuable Law Library is accessible to the students. It contains the Federal reports, the more important older State reports, all the recent State reports, and a large number of text-books, works of reference, and legal periodicals, American and foreign. It contains the more important English reports, of which it will soon have complete sets.

PRACTICE WORK AND MOOT COURTS.

In connection with the several courses, the students will be familiarized with brief-making and with the prevailing rules in American courts.

The students have organized a Law Club for the primary purpose of holding Moot Courts. These courts are aided with the advice and direction of members of the Faculty.

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LOWER DIVISION COURSES.

10. **Elementary Law and Jurisprudence.** Mr. DORETY.

The general prnciples of the law. Designed for students of the Colleges of Letters, Social Sciences, and Commerce.

2 hrs., throughout the year. Tu Th, 8.

18. **Commercial Law.** Mr. DORETY.

2 hrs., throughout the year. Tu Th, 8. Designed especially for students in the College of Commerce.

UPPER DIVISION COURSES.

3. **Principles of International Law.** (G.E.) Dr. HENGSTLER.

2 hrs., throughout the year. Tu, 4-6.

*1. **Formation of the Federal Constitution.** (G.E.) Professor JONES.

1 hr., either half-year. Prerequisite: Any two courses in History and Political Science.

5. **Roman Law.** (G.E.) Professor JONES.

A systematic and historical exposition of the principles of Roman law, with free use of the material in the Institutes and Digest. Special attention is given to the subjects of property, contracts and delicts.

2 hrs., throughout the year. Tu Th, 10. Required for the Group Elective in Jurisprudence; but students may take instead two of the three courses given in the Department of Latin, namely, Courses 21, 80, and 81.

***The Institutes.** [See Latin 21.] (G.E.) Professor MERRILL.

The Institutes of Gaius and of Justinian.

2 hrs., first half-year. Tu Th, 11.

The Sources of Roman Law. [See Latin 80.] (G.E.) Professor MERRILL.

Bruns' Fontes Juris Romani. Reading and lectures.

2 hrs., first half-year. Tu Th, 11.

Select Titles from the Digest. [See Latin 81.] (G.E.) Professor MERRILL.

Titles 18, 19, 20, 21, and 13.6, being part of the law of contracts.

2 hrs., second half-year. Tu Th, 11.

*Not to be given in 1905-06.

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***Old English Laws.** [See English 11B.] (G.E.)

Professor LANGE.

Sources, characteristic features, and cultural aspects. Translation and collateral reading.

2 hrs., second half-year. Prerequisite: Course 11A.

THE PROFESSIONAL CURRICULUM.

First Year.

11. **The Law of Property.** (First year.) (G. E.) Mr. DORETY.

Distinction between real and personal property; acquisition of rights in personal property; gifts; bailment; lien; pledge. Real property; tenures; estates; seisin and conveyance; Statute of Uses; incidents of ownership in real property; fixtures; profits; natural rights; easements; covenants as to use; public rights; franchises; rents.

3 hrs, throughout the year. Tu Th, 10.

12. **The Law of Torts.** (G.E.) Professor JONES.

Trespass to person, to real property and to personal property; excuses for trespass; conversion; legal cause; negligence; contributory and imputed negligence; plaintiff's illegal conduct as a defense; duties of landowners; hazardous occupations; liability for animals; deceit; defamation: slander, libel, privilege, malice; malicious prosecution, criminal and civil; interference with social and business relations: inducing breaches of duty, fair and unfair competition, strikes, boycotts, business combinations.

2 hrs., throughout the year. Tu Th, 9.

13. **Criminal Law and Procedure.** (G.E.)

Associate Professor MCMURRAY.

The sources of the criminal law; criminal procedure; general analysis of the criminal act and of the criminal intent; conditions of criminal responsibility; parties and jurisdiction; the analysis of particular crimes, including crimes against the person, larceny and kindred crimes (with particular emphasis on the doctrine of possession under the English law), crimes against the dwelling-house, and conspiracy.

3 hrs., throughout the year. M W, 11.

*Not to be given in 1905-06.

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15. **The Law of Contracts.** (G.E.) Assistant Professor BOKE.

An investigation of the principles in recorded cases, and the application of those principles, of such important phases of contracts as: the doctrine of mutual assent, and its questions of acceptance and revocation of offer; the doctrine of consideration, its historical development and modern aspect; requisites of contracts under seal; rights of parties under the contract, including assignee of a contract, third person beneficiary under a contract, and joint obligors; contracts under the Statute of Frauds; performance of contracts,—conditions, express and implied; impossibility; illegal contracts; contracts in restraint of trade.

4 hrs., throughout the year. M W F —, 8.

19. **Common Law Procedure.** (G.E.)
Assistant Professor MCMURRAY.

A study of the common-law system of procedure as it existed at the most favorable time for its investigation, viz., from the adoption of the Hilary Rules, in 1834, to the adoption of the Common Law Procedure Act in 1852. Designed to serve as an introduction to the general subject of Procedure.

2 hrs., second half-year. M W, 10.

GRADUATE COURSES.

THE PROFESSIONAL CURRICULUM.

Second and Third Years.

17. **The Law of Property.** (Second year.) [1906-07.]
Assistant Professor MCMURRAY.

The acquisition and devolution of title, including original acquisition, adverse possession and prescription, conveyances (and particularly, deeds), wills, gifts *mortis causa,* succession, descent, and administration of decedents' estates.

2 hrs., throughout the year. Tu Th, 9.

20. **Agency.** [1906-07.] Assistant Professor MCMURRAY.

A general view of the Law of Agency under the Anglo-American system.

2 hrs., first half-year. M W, 10.

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30. **Negotiable Instruments.** [1905-06.]
Assistant Professor McMurray.

The fundamental principles of the law of commercial paper in the Anglo-American system.

2 hrs., first half-year. M W, 10.

21. **The Law of Evidence.** [1905-06.] Mr. Olney.

The nature of evidence; the jury; judicial notice; burden of proof; presumptions; admissions; law and fact; rules of exclusion; opinion evidence; real evidence; writings; competency, privilege, and examination of witnesses.

2 hrs., throughout the year. S, 8-10.

27. **The Law of Trusts.** [1905-06.] Assistant Professor Boke.

Nature and requisites of a trust; language necessary to create a trust, consideration, subject-matter, the *cestui que trust,* the trustee; nature of *cestui que trust's* interest; transfer of trust property, by act of the party, by death, by forfeiture, by marriage, by bankruptcy, by act of the creditors; extinguishment of a trust; duties of a trustee.

2 hrs., throughout the year. Tu Th, 10.

22. **The Principles of Equity.** [1906-07]
Assistant Professor Boke.

The nature of equity jurisdiction: specific performance of contracts, including such aspects as extent of the jurisdiction from the subject-matter of the contract, relief for and against third persons, legal consequences of the right of specific performance, consideration, the Statute of Frauds—part performance, fraud, misrepresentation, concealment, mistake, hardship, and mutuality of relief; bills for an account; specific reparation and prevention of torts, waste, trespass, disturbance of easements, nuisance, and miscellaneous exclusive franchises.

2 hrs., throughout the year. Tu Th, 10.

24. **The Law of Sales.** [1906-07.] Professor Jones.

Subject-matter of sale; executory and executed sales; bills of lading and jus disponendi; stoppage in transitu; fraud; factors' acts; warranty; Statute of Frauds.

3 hrs., first half-year. Tu Th F, 8.

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26. **The Law of Public Service Companies and Carriers.** [1906-07.]
Professor JONES.

Nature of public calling; railroads and canals; telegraph and telephone; light and water companies; irrigation and drainage; inns and warehouses. Common carriers of goods and passengers; connecting carriers; actions against carriers; tickets; baggage; compensation and lien.

3 hrs., second half-year. Tu Th F, 8.

25. **The Law of Corporations.** [1905-06.]
Assistant Professor BOKE.

Private Corporations: Legal conception of a corporation; creation of the corporation; corporations **de facto**; implied powers of corporations; directors; rights of stockholders; liability of corporation for torts; for crimes and contempts; **ultra vires** transactions; rights and remedies of creditors; forfeiture of charter on **quo warranto**; powers of a corporation; trusts; the charter as a contract; modes of dissolution; foreign corporations. Municipal Corporations: Legislative control; rights and remedies of creditors; liability for torts; implied power to contract on credit, borrow money, and issue negotiable paper; express restrictions of the power of incurring indebtedness.

2 hrs., throughout the year. M W, 9.

33. **Conflict of Laws.** [1906-07.]
Assistant Professor BOKE.

Jurisdiction; sources of law and comity; territorial jurisdiction; jurisdiction *in rem* and *in personam;* remedies, right of actions and procedure; creation of rights; recognition and enforcement of rights; personal relations, property, inheritance, administration of estates, judgments.

2 hrs., throughout the year. M W, 9.

16. **The Law of Mines and Water.** [1905-06.]
Professor LINDLEY.

1 hr., throughout the year.

32. **The Law of Insurance.** [1905-06.] Mr. JACOBS.

1 hr., throughout the year. F, 4.

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2. **Constitutional Law.** [1905-06.] Professor JONES.

Constitutional Law of the United States, both State and Federal. Written constitutions: making, revision, and amendment; separation of powers; Federal jurisdiction; citizenship; fundamental civil and political rights; the later amendments to the Federal Constitution; unclassified legislative power; the police power; eminent domain; taxation; ex post facto and retroactive laws; obligation of contracts; regulation of commerce; money.

3 hrs., throughout the year. Tu Th F, 8.

29. **Code Procedure.** [1905-06.]

Assistant Professor MCMURRAY.

Analysis and development of the fundamental notions underlying the American Reformed System of Civil Procedure, and comparison of that system with other systems of civil procedure; the proceedings in connection with an action from the selection of the tribunal to the final judgment. Particular attention is given to the system as illustrated and developed in the Western States of America.

3 hrs., throughout the year. Tu Th F, 9.

NOTE.—Students planning to take the law courses in their Senior year should have all other college work completed by the end of their Junior year.

Students in the College of Commerce who desire to take more than Courses 10, 18 and 3 should consult the head of the department.

Roman law is prerequisite to all courses except 10, 3 and 18, and should be taken in the Junior year.

Graduate standing implies that the student has credit for Courses 5, 11, 12, 13, 15, 19.

English 11B, Old English Laws, together with English 11A, and Latin 21, 80 and 81, may be included in the Group Elective in Jurisprudence.

Mid-year Examinations will not be held in Courses 11, 12, 13 and 15, or in the Graduate year-courses.

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HISTORY.

BERNARD MOSES, Ph.D., LL.D., Professor of History and Political Science.

THOMAS R. BACON, A.B., B.D., Professor of Modern European History.

H. MORSE STEPHENS, M.A., Professor of History and Director of University Extension.

THOMAS W. PAGE, Ph.D., Associate Professor of Mediaeval History.

WILLIAM S. FERGUSON, Ph.D., Assistant Professor of Greek and Roman History.

JEROME B. LANDFIELD, A.B., Instructor in History.

EUGENE I. MCCORMAC, Ph.D., Instructor in American History.

1. The general prerequisites to all courses in the Upper Division are any two of the following three: History 52, 54, and Political Science 1 and 2.

2. The Department of History will recommend for the High School Teachers' Certificate only such students as have completed a course (6 units) in Government, Ancient History, English History, Mediaeval History, and in either Modern European or American History; and as have passed a final examination upon the general content, sources of knowledge, and bibliography of the various history-subjects taught in the High Schools.

The examination of candidates for the Teachers' Certificate will begin in December, 1906.

It should be observed that a reading knowledge of French or German is necessary for some Upper Division courses in the Department of History.

LOWER DIVISION COURSES.

The work in History and Political Science prescribed in the various colleges of the University must be taken from the first three Lower Division Courses.

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52. **History of England.** Professor STEPHENS.

Lectures on the political and constitutional history of England, with the study of the documents contained in Adams' and Stephens' Select Documents of English Constitutional History.

3 hrs., throughout the year. M Tu W, 2.

54. **History of Rome.** Assistant Professor FERGUSON.

A general survey of the history of the Roman Republic, the Roman Empire, and the late-Roman and early-Byzantine periods.

3 hrs., throughout the year. M W F, 1.

Government. [See Political Science 1 and 2.]
Professor MOSES.

56A. **The French Revolution: The History of Europe from 1789 to 1800.** Professor BACON.

3 hrs., first half-year. M W F, 10. Prerequisite: Any six units of History.

FREE ELECTIVE COURSES IN THE LOWER DIVISION.

From the following courses, which, unless otherwise specified, are open to all students in the University, but which will be counted neither as prescribed nor as advanced work, History 64 and Economics 2 should be selected by those who may desire to add to the normal 12 units of History of the Lower Division.

55. **Latin-American History and Institutions.** Professor MOSES.

Spanish and Portuguese settlement and administration during the Colonial Period; the War of Independence; the political development of the Latin-American Republics.

3 hrs., second half-year. M W F, 2.

64. **History of the Middle Ages.** Associate Professor PAGE.

A general survey of the history of Western Europe to the end of the Reformation Movement.

3 hrs., throughout the year. M W F, 1. Prerequisite: Course 54 and a reading knowledge of French or German.

Principles of Economics. [See Economics 2.] Professor MILLER.

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UPPER DIVISION COURSES.

Students who choose to take their Major Subject in History must select exclusively from courses listed below.

***History of the Semitic Nations to the Rise of Islam.** [See Semitic 24.] Associate Professor MARGOLIS.

History of the Mohammedan Countries from the Rise of Islam to the Present Day. [See Semitic 25.]
Associate Professor MARGOLIS.

53. **History of Greece.** Assistant Professor FERGUSON.

A consideration of the history of Greece in which special emphasis is laid upon the origin, character, and influence of its culture.

3 hrs., first half-year. M W F, 2. Prerequisite: Course 54.

64. **History of the Middle Ages.** Associate Professor PAGE.

A general survey of the history of Western Europe to the end of the Reformation Movement.

3 hrs., throughout the year. M W F, 1. Prerequisite: Course 54 and a reading knowledge of French or German.

56B. **The French Revolution: The History of Europe from 1800 to 1815.** Professor BACON.

3 hrs., second half-year. M W F, 10. Prerequisite: Course 56A.

57. **Europe in the Nineteenth Century.** Mr. LANDFIELD.

3 hrs., second half-year. Tu Th S, 9.

*59. **Constitutional History of England to 1485.** ——— ———.

A detailed study of the origin and growth of the constitution and the principles of public law in England.

3 hrs., throughout the year. Prerequisite: Course 52.

*60. **Constitutional History of England since 1485.**
Professor STEPHENS.

A detailed study of the development of constitutional government in England from the end of the Middle Ages to the present time.

3 hrs., throughout the year. M W F, 2. Prerequisite: Course 59.

*Not to be given in 1905-06.

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62A. **Constitutional History of Rome.**

Assistant Professor FERGUSON.

In this course problems will be discussed in connection with the tribal kingship, the patrician aristocracy, the growth of constitutional government, the senate, the organization of Italy, the administration of the provinces, the programmes of reform and revolution, the dyarchy, and the development of despotism.

3 hrs., second half-year. M W F, 2. Prerequisite: Course 53A or 54, and a reading knowledge of Latin, and French, or German.

63. **Modern European History.**

Professor STEPHENS and Mr. LANDFIELD.

Lectures on the History of Europe from 1600 to 1890, based on Stephens' Syllabus of a Course of Lectures on European History.

3 hrs., throughout the year. M Tu W, 1. Prerequisite: Course 52, as given in and after 1902-03, Course 64, and a reading knowledge of French or German.

63A. **Historical Geography of Modern Europe.** Mr. LANDFIELD.

A study of the map of Europe by treaty, and of the geographical development of modern European States.

2 hrs., first half-year. Th F, 1.

70. **American History from the Discovery to 1850.**

Dr. MCCORMAC.

A brief review of the period of explorations; a detailed study of colonial institutions; the formation of the Constitution; and the political and social development of the Unied States.

3 hrs., throughout the year. M W F, 8.

71. **History of the United States since 1850.** Dr. MCCORMAC.

A detailed study of the Civil War and the Reconstruction period, and the important features of recent history.

3 hrs., second half-year. M W F, 9. Prerequisite: Course 70.

77. **The Economic Factors in American History.**

Associate Professor PAGE.

This course is intended to present in their historical perspective the facts and tendencies in the growth of American commerce, industry, and finance, and to indicate their influence on the constitutional and social development of the nation.

3 hrs., throughout the year. M W F, 3. Prerequisite: Course 70.

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80A. **Institutional History.** Professor BACON.

The institutions of the late-Roman and Byzantine empires. The forms of life prevalent among the Germanic invaders. A comparison of the institutions and the forms with one another and with analougous phenomena elsewhere. The growth and influence of institutions, etc.

2 hrs., first half-year. Tu Th, 9. Prerequisite: 20 units of History.

86. **Diplomatic History of the United States.** Dr. MCCORMAC.

History of the foreign relations of the United States from the beginning of the Revolution to the close of the Civil War. Special attention is given to the commercial treaties following the Revolution, to annexations of territory, to the relations with Spanish America, and the period of the Civil War.

3 hrs., first half-year. M W F, 10. Prerequisite: Course 70.

87A. **The Renaissance and Reformation: The Renaissance. The Transition from Mediaeval to Modern History.**

Professor BACON.

3 hrs., first half-year. M W F, 9. Prerequisite: 20 units of History. (Six units of Political Science or Economics may be substituted for a corresponding number of units in History.)

87B. **The Renaissance and Reformation: The Protestant Reformation and the Catholic Reaction.**

Professor BACON.

The religious and ecclesiastical aspect of the transition from mediaeval to modern history.

3 hrs., second half-year. M W F, 9. Prerequisite: Course 87A.

104. **The Teaching of History.** Professor STEPHENS.

A discussion of the teaching of history in secondary schools, with special emphasis on the methods and materials. The course is designed for seniors and graduates expecting to apply for a high school teacher's certificate in history.

2 hrs., either half-year. Tu, 3. Prerequisite: Courses 52, 54, 64, 63, and 70, and Political Science 1.

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FREE ELECTIVE COURSES IN THE UPPER DIVISION.

The following courses are open to all students in the University. They should be entered in preference to Lower Division Courses in History by Juniors and Seniors whose Major Subject lies in other departments. They will be counted neither as prescribed nor as advanced work.

68A. **Eastern Europe.** Mr. LANDFIELD.

A study of the rise and development of Russia, and its relations with other nations in Europe and Asia.

3 hrs., first half-year. Tu Th S, 9.

68B. **The Eastern Question.** Mr. LANDFIELD.

A study of the problems of Eastern Europe, Central Asia and the Far East, which make up what is commonly termed the Eastern Question, including the Turkish position in Europe and the Russian advance toward India and on the Pacific.

2 hrs., throughout the year. Tu Th, 10.

111. **Outline of Spanish History.** Professor BACON.

2 hrs., second half-year. Tu Th, 9.

112. **History of Canada.** Assistant Professor FERGUSON.

Lectures on the political history of Canada, particularly during the nineteenth century.

2 hrs., first half-year. Tu Th, 11.

COURSES IN OTHER DEPARTMENTS.

The History of the People, Language, and Literature of China. [See Oriental Languages 1.] Professor FRYER.

History of the Laws, Government, and Social Condition of China. [See Oriental Languages 11.] Professor FRYER.

GRADUATE COURSES.

69. **Russian Institutions.** Mr. LANDFIELD.

A study of the political, administrative, and economic development of the Russian Empire.

2 hrs., throughout the year. F, 2-4. Prerequisite: Course 68A, and a reading knowledge of French or German.

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*82. **Greek Epigraphy.** Assistant Professor FERGUSON.

The history of the Greek alphabet and the interpretation of the more important inscriptions of the Hellenistic period.

2 hrs., first half-year. Text-book: Dittenberger's Sylloge Inscriptionum Graecarum.

92. **Investigation Course in the History of the United States.** Dr. MCCORMAC and Associate Professor PAGE.

A course in original research upon assigned topics, with class reports and criticisms.

2 hrs., throughout the year. Tu Th, 11.

*93. **History of the Christian Church.** Professor BACON.

The spread of Christianity, and the doctrine and polity of the Church.

2 hrs., throughout the year. Tu Th, 10.

94. **History of Eastern Christendom.** Professor BACON.

A critical study of the political, social, and religious institutions of the Eastern Christian nations.

2 hrs., throughout the year. Th, 2-4.

107. **Seminary in Ancient History.** Assistant Professor FERGUSON.

This is intended for the prosecution of specialized work in problems of Greek and Roman history. A subject is assigned to each member for investigation in regard to which periodic reports and a final statement of results are expected. Admission to the seminary rests with the instructor. A reading knowledge of Greek, Latin, and French or German is necessary.

During 1905-06 subjects are assigned from the Post-Alexandrian period of Greek History.

2 hrs., throughout the year. F, 4-6.

108. **Seminary in European History—**

Mediaeval: Associate Professor PAGE.

Modern: Professor STEPHENS.

Open to Seniors with the consent of the instructor.

2 hrs., throughout the year. M, 4-6.

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*Not to be given in 1905-06.

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POLITICAL SCIENCE.

BERNARD MOSES, Ph.D., LL.D., Professor of History and Political Science.

WILLIAM S. FERGUSON, Ph.D., Assistant Professor of Greek and Roman History.

1. The general prerequisites to all courses in the Upper Division are any two of the following three: History 52, 54, and Political Science 1 and 2.

LOWER DIVISION COURSES.

(The work in History and Political Science prescribed in the various colleges of the University must be taken from the Lower Division.)

1. **Government.** Professor MOSES.

A discussion of the simpler principles of political science, together with a description of governmental institutions and operations in federal and other republics.

3 hrs., first half-year. M W F, 3.

2. **Government.** Professor MOSES.

The institutions and governmental procedure in constitutional and other monarchies.

3 hrs., second half-year. M W F, 3.

History 55 (Latin-American History and Institutions, Professor Moses), may be taken as a substitute for Political Science 2, and may be counted as three units of Government.

UPPER DIVISION COURSES.

6. **Greek Institutions.** Assistant Professor FERGUSON.

The origin and working of the mechanism of government in typical oligarchic, democratic, federal, and monarchic states. International relations. The Greek theory of government.

3 hrs., first half-year. M W F, 3. Prerequisite: Course 53 or 53A and a reading knowledge of French or German.

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2. **History of Political Theories.** Professor MOSES.

The history of political thought to the middle of the eighteenth century, and its influence on institutions.

3 hrs., first half-year. M W F, 2. Prerequisite: Course 1.

*3. **Theory of Social Progress.** Professor MOSES.

A critical examination of the theories hitherto offered to explain the forces, methods and aims of social progress.

2 hrs., first half-year. Prerequisite: Course 2.

*5. **Comparative Constitutional Law.** ——— ———.

A comparative view of the development and present condition of the political institutions of the Western nations.

3 hrs., first half-year. Prerequisite: Three courses in European history.

7. **International Relations.** Professor MOSES.

Course 1 deals with the organization and operations of government with reference to internal affairs: Course 7, with international relations.

2 hrs., second half-year. Tu Th, 3. Prerequisite: Course 1.

8. **The Government of Dependencies.** Professor MOSES.

An account of the rise, organization and administration of political dependencies, excluding the former European Colonies in America.

2 hrs., first half-year. Tu Th, 3. Prerequisite: Course 1.

COURSES IN OTHER DEPARTMENTS.

History of England. [See History 52.] Professor STEPHENS.

History of Rome. [See History 54.]
Assistant Professor FERGUSON.

GRADUATE COURSES.

*4. **Political Science.** Professor MOSES.

A course of graduate study in the science of politics, including the history of political thought since the middle of the eighteenth century.

2 hrs., second half-year.

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*Not to be given in 1905-06.

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ECONOMICS.

ADOLPH C. MILLER, M.A., Flood Professor of Political Economy and Commerce.

CARL C. PLEHN, Ph.D., Associate Professor of Finance and Statistics, on the Flood Foundation.

HENRY RAND HATFIELD, Ph.D., Associate Professor of Accounting, on the Flood Foundation.

WESLEY C. MITCHELL, Ph.D., Assistant Professor of Commerce, on the Flood Foundation.

†LINCOLN HUTCHINSON, M.A., Assistant Professor of Economic Geography.

SIMON LITMAN, Dr.jur., Instructor in Commercial Practice.

JESSICA B. PEIXOTTO, Ph.D., Lecturer in Socialism.

ELWOOD MEAD, M.S., C.E., Professor of the Institutions and Practice of Irrigation.

THOMAS W. PAGE, Ph.D., Associate Professor of Mediaeval History.

‡ERNEST C. MOORE, LL.B., Ph.D., Assistant Professor of Education.

ALBERT W. WHITNEY, A.B., Assistant Professor of Mathematics.

The courses prerequisite to a Major Subject in the Department of Economics are Economics 2 and any one of the following: Economics 1, Political Science 1 and 2 and History 52. No part of the work in the Major Subject is to be undertaken until the prerequisite courses shall have been completed. But students who plan to take less than twelve units of Upper Division work in this department may proceed immediately with the advanced courses for which they have the particular prerequisites.

Students in the College of Commerce will take Course 1 in their Freshman year, and will, ordinarily, take Course 2 in their Sophomore year; they must take both 1 and 2. Students in the other colleges may omit Course 1, but before taking advanced courses they must take course 2, which counts as prescribed History in the three colleges of general culture. Students in Commerce are required to take Course A each half-year for four years.

†Absent on leave during the first half-year, 1905-06.

‡Absent on leave during 1905-06.

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LOWER DIVISION COURSES.

In addition to the following Lower Division Courses, see Courses 8, 9, 11A, and 14.

A. **Lectures on Commerce.** In charge of Professor HATFIELD.

A series of lectures on subjects relating to modern business, by men of affairs.

1 hr., throughout the year, ½ unit each half-year. M, 4. Prescribed each year for all students in the College of Commerce.

1. **Introduction to Economics.**

Professor MILLER and Dr. LITMAN.

A study of the elementary facts and laws of industrial organization as exhibited in the growth of industry and commerce in Europe and America since the middle of the eighteenth century.

3 hrs., throughout the year. M W F, 9. Prescribed for all students in the College of Commerce.

2. **Principles of Economics.** Professor MILLER.

A systematic view of the leading principles of economics on the basis of a selected text.

3 hrs., first half-year. M W F, 10. Prerequisite: At least Sophomore standing; and, for students in the College of Commerce, Course 1.

N.B.—This course is required of all students who intend to take any advanced courses in Economics.

5. **Economics of Industry.** Associate Professor PLEHN.

An elementary course planned primarily to meet the needs of the students in the Engineering Colleges.

3 hrs., first half-year. Tu Th S, 8. Students in the three Colleges of General Culture may count this as either Lower or Upper Division work.

N.B.—This course will not be accepted as fulfilling any prescribed work in the College of Commerce.

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3. **Introduction to Economic Geography.**

Assistant Professor HUTCHINSON.

The elements of scientific geography; relation between geographical phenomena and economical development; brief survey of the resources of the leading countries of the world.

3 hrs., first half-year.† Tu Th S, 9.

*4. **The Materials of Commerce.**

Assistant Professor HUTCHINSON.

The principal commodities which enter into commercial dealings; causes promoting their production; effects of climate, soil, and other conditions; detailed study of their sources, and of the markets in which they are sold.

3 hrs., second half-year. Tu Th S, 10. Prerequisite: Course 3.

*4A. **Geography of International Trade.**

Assistant Professor HUTCHINSON.

Demand and supply in the world markets; exports and imports of the leading countries; sea-ports; commercial and industrial centers; routes and methods of transportation; postal and telegraphic communication, etc.

2 hrs., second half-year. Tu Th, 11. Prerequisite: Course 3.

UPPER DIVISION COURSES.

*5A. **American Agriculture.** (G.E.) Associate Professor PLEHN.

Leading factors in the development of agriculture in the United States and a study of its present condition from an economical point of view. This course will be based largely upon the materials furnished by the government reports and the census returns.

3 hrs., second half-year. M W F, 1. Prerequisite: Course 1 or 2, except that advanced students in the College of Agriculture may be admitted, with the consent of the instructor, without these prerequisites, but a familiarity with the fundamental ideas and terminology of economics is desirable.

6. **History of International Trade.** (G.E.)

Assistant Professor HUTCHINSON.

Mediaeval commerce and the "Golden Age" of the Italian Republics; Turkish conquests and the "Age of Discovery"; new routes and the shifting of trade centers; the era of

*Not to be given in 1905-06.

†During 1905-06 this course will be given in the second half-year.

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colonization and commercial rivalries; mercantilism and its results; nineteenth century commerce; its development and problems.

3 hrs., first half-year.† Tu Th S, 10. Prerequisite: Course 3 and one course in English History.

7. **Modern Industrialism.** (G.E.) Professor MILLER.

A descriptive and interpretative account of the rise of the modern industrial system, especially as affected by the Industrial Revolution. The workings of competition in the nineteenth century and the recent tendency toward the formation of industrial monopolies will receive particular attention.

3 hrs., second half-year. M W F, 10. Prerequisite: Course 2.

8. **Theory and History of Banking.** Assistant Professor MITCHELL.

A study of banking from the standpoint of its relations to the economic development of society. The functions performed by banks; the development of banking systems; the relations between banking operations and price-fluctuations, etc.

3 hrs., first half-year. M W F, 8. Prerequisite: Courses 1 and 2. This course may be counted as a Lower Division Course.

8A. **Practical Banking.** Associate Professor HATFIELD.

Consideration of the bank as a business institution; the relation between the bank and the depositor; the extension of credit; the internal organization and administration of the modern bank.

3 hrs., second half-year. Tu Th S, 10. Prerequisite: Course 8.

8B. **Money.** Assistant Professor MITCHELL.

A study of the economic problems centering around the monetary system.

3 hrs., second half-year. M W F, 8. Prerequisite: Courses 1 and 2.

8C. **Foreign Exchange.** (G.E.) Assistant Professor MITCHELL.

Methods of making international payments; bills of exchange, arbitrage, bank drafts, cable orders, shipment of specie, etc.

2 hrs., second half-year. Tu Th, 9. Prerequisite: Course 8 or 8B.

†During 1905-06 this course will be given in the second half-year.

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9. **Introduction to Public Finance.** (G.E.)

Associate Professor PLEHN.

The theory and methods of taxation, illustrated by the experience of various nations; the expenditure and administration of public funds; public debts. Especial attention will be paid to taxation in California.

3 hrs., first half-year. M W F, 2. Prerequisite: Course 1 or 2. This course may be counted as Lower Division work.

9A. **Taxation.** (G.E.) Associate Professor PLEHN.

An intensive study of the principles of taxation as illustrated by the practices of different countries.

3 hrs., second half-year. M W F, 3. Prerequisite: Course 9.

9C. **Municipal Finance.** (G.E.) Associate Professor HATFIELD.

A study of the revenues, expenditures, debt management and fiscal administration of American cities.

2 hrs., first half-year. Tu Th, 11. Prerequisite: Course 9 and at least Senior standing.

10. **Statistics.** (G.E.) Associate Professor PLEHN.

The history, theory, and methods of statistics. The collection, analysis, and presentation of statistical data relating to economics and kindred sciences. Practice in the use of mechanical, graphical, and other devices, and apparatus for tabulation, computation and analysis.

3 hrs., throughout the year, including one laboratory period. Tu Th, 11, and a laboratory period to be arranged. Prerequisite: Course 1 or 2, and at least Junior standing; Mathematics 20A must be taken in conjunction with this course. The consent of the instructor is also necessary.

11A. **Insurance.** (G.E.) Assistant Professor WHITNEY.

An elementary course in the principles and practice of Insurance. Mathematical treatment will be avoided, except where it is absolutely necessary for clearness.

3 hrs., first half-year. M W F, 1.

N.B.—This course may be counted as either Lower or Upper Division work.

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11B. **Actuarial Science.** Assistant Professor WHITNEY.

The mathematical basis of insurance. The theory of compound interest and annuities, construction of mortality tables, use of empirical formulae, calculation of premiums, reserves and surplus.

3 hrs., second half-year. M W F, 1. Prerequisite: Economics 1 or 2, 11A and 20A, and at least Mathematics 3C or its equivalent.

*11C. **Advanced Actuarial Science.** Assistant Professor WHITNEY.

An advanced course in actuarial theory and computing.

3 hrs., first half-year. Prerequisite: Courses 10 and 11B.

N.B.—Students who wish to prepare themselves for actuarial work should consult with the instructor concerning the best choice of their mathematical courses.

†20A. **Theory of Probabilities: Elementary Course.** (G.E.)
Assistant Professor WHITNEY.

2 hrs., first half-year. Tu Th, 9. This course is prerequisite to Courses 10 and 11B.

‡77. **Economic Factors in American History.** (G.E.)
Associate Professor PAGE.

This course is intended to present, in their historical perspective, the facts and tendencies in the growth of American commerce, industry, and finance, and to indicate their influence on the constitutional and social development of the nation. The topics treated in this course vary from year to year. In 1905-06 the chief stress will be laid on land tenure and agriculture.

3 hrs., first half-year. M W F, 3. Prerequisite: Courses 1 or 2 and two courses in American History.

*12. **Industrial and Commercial History of the United States.** (G.E.)
Assistant Professor HUTCHINSON.

A study of the economic growth of the United States during the nineteenth century. The object is to give the student an understanding of causes which have brought the country to its present position among the nations of the world, and a basis for discussion of the leading commercial problems of to-day.

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*Not to be given in 1905-06.

†May be recorded as Mathematics 20A or Economics 20A.

‡This course may be recorded as Economics 77 or History 77.

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3 hrs., second half-year. Tu Th S, 9. Prerequisite: At least Sophomore standing, Course 3, and one course in American History.

*12A. **History of Economic Thought.** (G.E.) Professor MILLER.

A critical review of the leading systems of economic thought since the sixteenth century.

2 hrs., first half-year. Tu Th, 2. Prerequisite: Courses 1 and 2, and at least Junior standing.

13A. **Problems of Labor.** (G.E.) Assistant Professor MITCHELL.

The position of wage-earners in the economic organization of to-day.

3 hrs., second half-year. M W F, 9. Prerequisite: Courses 1 and 2, and at least Junior standing.

14. **Introduction to Accounting.** Associate Professor HATFIELD.

The interpretation of accounts with regard to the needs of the business manager rather than those of the accountant. The formation and meaning of the balance sheet. The profit and loss statement.

3 hrs., first half-year. Tu Th S, 9. Prerequisite: At least Sophomore standing and Course 1 or 2. N.B.—This course is a Lower Division course.

14A. **The Investment Market.** (G.E.) Associate Professor HATFIELD.

Investment securities, the various classes of stocks and bonds, the construction and use of bond tables, the course of prices in the investment market.

3 hrs., first half-year. Tu Th S, 10. Prerequisite: At least Senior standing.

14B. **Advanced Accounting.** Associate Professor HATFIELD.

A consideration of the more complicated problems of accounting.

3 hrs., second half-year. Tu Th S, 9. Prerequisite: Course 14, or its equivalent.

14C. **Corporation Finance.** (G.E.) Associate Professor HATFIELD.

A study of the organization and financial policy of large corporations. Especial attention given to the subject of industrial corporations and the organization of so-called "trusts."

2 hrs., second half-year. Tu Th, 8. Prerequisite: At least Junior standing.

*Not to be given in 1905-06.

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15. **Financial History of the United States.** (G.E.)
Professor MILLER.

A detailed study of the legislation and experience of the United States touching currency, banking, debt, taxation, expenditure, etc. The work will be based, as far as possible, on first-hand examination of sources.

2 hrs., first half-year. Tu Th, 2. Prerequisite: Course 2, and at least Junior standing.

16A. **Railway Economics.** (G.E.) Associate Professor PLEHN.

An examination of the chief financial and economic questions which arise in railway organization and management, embracing such topics as capitalization, speculation, and accounting, rate-making, competition, pooling, consolidation, etc.

3 hrs., second half-year. M W F, 2. Prerequisite: Course 1 or 2, and at least Junior standing.

*16B. **Railway Administration.** (G.E.)
Associate Professor PLEHN.

An advanced study of railway rates, administration, and finance.

3 hrs., first half-year. M W F, 1. Prerequisite: Course 16A.

23. **Modern Industrial Processes.** Dr. LITMAN.

The development and present condition of leading modern industries, with particular reference to such industries as now exist or may be established on the Pacific Coast; emphasis will be laid on the technical processes.

3 hrs., first half-year. M W F, 10. Prerequisite: Courses 1 and 2.

24. **Mechanism and Technique of Trade.** Dr. LITMAN.

Devices used by governments and individuals to promote commerce; exposition of the work performed by Boards of Trade, Commercial Museums, Mercantile Agencies, of transactions on Produce and Stock Exchanges, of modern wholesale and retail trade organizations. The course will include the reading by the student of mercantile publications, such as consular reports, trade and financial journals, etc.

3 hrs., first half-year. M W F, 8. Prerequisite: Courses 1 and 2.

24A. **Business Forms and Practice.** Dr. LITMAN.

Detailed study of methods and forms used in connection with the purchase, sale and forwarding of goods; calculations necessitated by the various systems of weights, measures and

*Not to be given in 1905-06.

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moneys in different countries; the significance of price quotations in different markets; the meaning and determination of standards and grades as to quality; the forms and functions of invoices, bills of lading, warehouse receipts, consular certificates, and other business documents relating to trade.

3 hrs., second half-year. M W F, 8. Prerequisite: Courses 1 and 2.

25. **Economic Crises and Depressions.** (G.E.)
Assistant Professor MITCHELL.

A study of recurrent fluctuations of business activity. Periods of active speculation, panic, liquidation, depression, and revival. The phenomena and their interpretation.

3 hrs., first half-year. M W F, 9. Prerequisite: Courses 8 and 8B.

*30. **Foreign Trade.** (G.E.) Assistant Professor HUTCHINSON.

A comparative study, from official sources, of the foreign trade in recent years of the principal commercial nations.

2 hrs., second half-year. Tu Th, 8. Prerequisite: Junior standing, Course 3, and a reading knowledge of French, German, or Spanish.

31. **Consular Service.** (G.E.) Assistant Professor HUTCHINSON.

A brief history of the consular service, followed by a technical study of the training and duties of consuls and the practice of the leading commercial nations in regard to appointments, etc.

2 hrs., first half-year.† Tu Th, 8. Prerequisite: At least Junior standing; the consent of the instructor must be obtained before enrollment.

*35. **Customs Tariffs and Regulations.** Dr. LITMAN.

Tariffs and existing reciprocity treaties and agreements of the leading commercial nations with special reference to the Tariff Law and Customs Regulations of the United States. A short tariff history and a general discussion of the aims and means of tariff policies will precede the practical part of the course, which latter will acquaint the student with the problems confronting the American importer and exporter in connection with duties, bounties, etc.

2 hrs., first half-year. Tu Th, 2. Prerequisite: Course 1.

*Not to be given in 1905-06.

†During 1905-06 this course will be given in the second half-year.

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*36. **Modern Colonial Economics.** Dr. LITMAN.

The principal commercial and industrial problems which arise in connection with colonial conditions, as illustrated by the experience of the leading colonizing nations. The object of this course is to acquaint the student with questions confronting a merchant and an investor in different colonies, and to show him how these have been and may be dealt with.

2 hrs., second half-year. Tu Th, 2. Prerequisite: Courses 1 and 2.

37. **Communication and Transportation.** Dr. LITMAN.

Means and methods of communication and transportation other than railroads, and their utilization in the service of commerce. An exhaustive study of internal, coast, and transoceanic shipping, of modern harbor facilities, of the post, the express, the telegraph, the telephone, etc.

3 hrs., second half-year. M W F, 10. Prerequisite: Course 1 or 2.

40. **Economic Origins.** (G.E.) Assistant Professor MITCHELL.

An investigation of the origin and early development of fundamental economic habits and institutions.

2 hrs., first half-year. Tu Th, 9. Prerequisite: Courses 1 and 2, and at least Senior standing.

42. **Contemporary Socialism.** (G.E.) Dr. PEIXOTTO.

A study of the program and methods of the contemporary socialistic parties; a critical investigation of the theories on which these programs are based.

3 hrs., first half-year. M W F, 3. Prerequisite: Courses 1 and 2, and at least Junior standing.

43. **History of Socialism.** (G.E.) Dr. PEIXOTTO.

An examination of the antecedents of contemporary socialism.

3 hrs., second half-year. M W F, 3. Prerequisite: Course 42.

45. **Advanced Economics.** (G.E.) Professor MILLER.

This course is designed for students who wish to make a more thorough study of economic theory than can be undertaken in Courses 1 and 2. The aim is to work out a tenable system of economics on the basis of an examination of the theories of leading writers, past and present.

2 hrs., second half-year. Tu Th, 2. Prerequisite: Courses 1 and 2, and at least Senior standing.

*Not to be given in 1905-06.

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*18. **Methods of Modern Charities and Corrections: Theoretical.**
Assistant Professor MOORE.

Studies in the administration of poor relief, the treatment of delinquents and defectives. Readings and lectures.

2 hrs., first half-year. Tu Th, 2. Prerequisite: Course 1 or 2, and Philosophy 2. Class to be limited at the discretion of the instructor.

*19. **Methods of Modern Charities and Corrections: Investigation.**
Assistant Professor MOORE.

Investigation and field work to be done in part in connection with the Associated Charities of San Francisco and Oakland.

2 hrs., second half-year. Tu Th, 2. Prerequisite: Course 18.

27. **Commercial Reviews and Trade Journals.**
Associate Professor HATFIELD.

Instruction in the use of current commercial, business and trade journals, and similar publications.

1 hr., throughout the year; 1 unit each half-year. Tu, 4. Prerequisite: At least Senior standing and 15 units of Economics. Prescribed for all Seniors in the College of Commerce.

COURSES IN OTHER DEPARTMENTS.

Commerce of China and Japan. [See Oriental Languages 1A.]
Professor FRYER.

Economic Botany. [See Botany 14.] Mr. H. M. HALL.

Organization of the Irrigation Industry. [See Irrigation 1.]
Professor MEAD.

GRADUATE COURSES.

See also Courses 10, 11C, 12A, 16B, 40, and 45, above which are for Graduates and Advanced Undergraduates.

20. **History and Theory of Prices.** Associate Professor PLEHN.

The methods of scientific investigation applicable to a study of prices and the causes of their fluctuations.

The course runs throughout the year and credit will be given according to work done. A good training in economics and mathematics and a reading knowledge of French and German are prerequisite.

*Not to be given in 1905-06.

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†20c. **Mathematical Economics.** (G.E.)

Assistant Professor WHITNEY.

The mathematical treatment of the theory of value. A course of reading for graduate students.

1 hr., second half-year. Hours to be arranged. Prerequisite: A thorough course in Calculus.

26. **Seminary in Economics.** Professor MILLER.

Under this head are included arrangements for the guidance of the work of individual students, or groups of students, competent to engage in economic research. The results will be presented to the seminary for discussion as occasion may suggest. The course runs throughout the year, and credit will be given according to work done.

38. **Commercial Resources of the Spanish-American Countries.** (G.E.)

Assistant Professor HUTCHINSON.

Detailed study of the geography, natural resources, and possibilities of development of these countries, devoting a year to each. In 1905-06 the Argentine Republic will be studied. Particular attention is given to commerial relations with the United States.

2 hrs., throughout the year. Hours to be arranged. Open only to graduate students who satisfy the instructor of their preparation for the work.

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†May be recorded as Mathematics 20c or Economics 20c.

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ANTHROPOLOGY.

FREDERIC W. PUTNAM, M.A., Sc.D., Professor of Anthropology and Director of the Museum of Anthropology.

JOHN C. MERRIAM, Ph.D., Assistant Professor of Palaeontology and Historical Geology.

GEORGE A. REISNER, Ph.D., Hearst Lecturer in Egyptology.

MAX UHLE, Ph.D., Hearst Lecturer in Peruvian Archaeology.

ZELIA NUTTALL, Field Director of Crocker-Reid Researches in Mexico.

ALFRED L. KROEBER, Ph.D., Instructor in Anthropology and Secretary of the Department of Anthropology.

PLINY E. GODDARD, Ph.D., Instructor in Anthropology.

EDWARD M. HUSSEY, Museum Assistant in Anthropology.

The Department of Anthropology, instituted in 1901 in order to organize and coördinate the numerous archaeological and ethnological researches supported in behalf of the University by Mrs. Phoebe A. Hearst, is under the direction of an Executive Committee consisting of Professor Putnam, Chairman; Professor Merriam, Secretary; President Wheeler; and Mrs. Hearst. The Department is devoted primarily to research and the formation of a museum.

Courses 1A and 1B, 3A and 3B, and 9 give parallel preparation for research work in ethnology, linguistics, and archaeology. Preceded by course 5 and followed by 7 and 8, they are intended to furnish systematic instruction to prospective anthropologists. As far as feasible they are based on museum and field work. Courses 1A and 1B are given in alternate years. They are alike in method and treatment, differing only in subject-matter, and either may be taken first. Courses 3A and 3B are related to each other like 1A and 1B.

LOWER DIVISION COURSES.

5. **General Introduction to Anthropology.** Dr. KROEBER.

A course of lectures and reading outlining the main facts of physical anthropology, ethnology, and archaeology, and serving both as a general survey of anthropology and as a specific introduction to the more advanced courses in the Department, such as 1, 3, and 9. As far as the subject-matter

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allows, special attention will be given to the Indians of California.

3 hrs., first half-year. Tu Th, 11; third hour by appointment.

2. **Athapascans of the Pacific Coast.** Dr. GODDARD.

A course of lectures on their arts, manner of life, and social customs, followed by an examination of their myths. Museum material will be used in illustration.

2 hrs., second half-year. Tu Th, 11.

4. **Geological History of Man.** Assistant Professor MERRIAM.

1 hr., second half-year. Tu, 1. Prerequisite: Geology 5 or 1B.

UPPER DIVISION COURSES.

1A. **North American Ethnology.** Dr. KROEBER.

A detailed examination, based on extensive reading, of several distinctive North American cultures: Eskimo, Pueblo, and perhaps others.

3 hrs., first half-year. Hours to be arranged. Prospective students should consult the instructor.

*1B. **North American Ethnology.** Dr. KROEBER.

A detailed examination, based on extensive reading, of several distinctive North American cultures: Plains, North Pacific Coast, and perhaps others.

3 hrs., first half-year. Hours to be arranged. Prospective students should consult the instructor.

6A. **Experimental Phonetics.** Dr. GODDARD.

A laboratory course, consisting of dissections of the vocal organs of lower animals, an examination of prepared dissections of the human throat, experiments in the physics of sound, and a study of the elementary sounds composing human speech by means of the Rousselot apparatus.

4 hrs., second half-year; 2 units.

*6B. **Experimental Phonetics.** Dr. GODDARD.

A laboratory course in which some special problem is undertaken by the student.

4 hrs., second half-year; 2 units.

*Not to be given in 1905-06.

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3A. North American Languages. Dr. KROEBER.

A detailed examination, based on texts, of several North American languages.

3 hrs., first half-year. Hours to be arranged. Prospective students should consult the instructor.

***3B. North American Languages.** Dr. KROEBER.

A detailed examination, based on texts, of several North American languages.

3 hrs., first half-year. Hours to be arranged. Prospective students should consult the instructor.

9. North American Archaeology. Dr. KROEBER.

3 hrs., first half-year. Given at the Museum of the Department of Anthropology at the Affiliated Colleges, San Francisco, alternate Saturdays, or by appointment in Berkeley. Prospective students should consult the instructor.

12. The Determination of Linguistic Relationship. Dr. KROEBER.

A research course on the problems of linguistic relationship, with special attention to the conditions and causes of morphological groups of lexically unrelated languages and to the criteria and methods of determining genetic relationship. In this connection practical investigations are carried on. The course is general in scope, but based in part on the facts of linguistic diversity existing in North America and culminating in California, and in this connection is of direct ethnological bearing.

3 hrs., throughout the year.

13. The Religious Practices and Beliefs of Non-literary Peoples. Dr. GODDARD.

A study of the religious practices connected with the birth, development, death, and burial of the individual, and of the more general ceremonies performed at the change of seasons, or for the control of the elements, the production of food, and the safeguarding of the community against misfortunes. Especial attention is given myths which explain origins and creation, and beliefs concerning the human soul.

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*Not to be given in 1905-06.

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While the material for the course is drawn, for the most part, from the continent of North America, illustrations and comparisons are sought elsewhere. The work consists of reading and lectures followed by discussions.

2 hrs., second half-year. Tu Th, 10.

GRADUATE COURSES.

7. **Advanced Work in Ethnology.** Dr. KROEBER.

Throughout the year.

8. **Advanced Work in Primitive Languages.** Dr. KROEBER.

Throughout the year.

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LINGUISTICS.

BENJ. IDE WHEELER, Ph.D., LL.D., President of the University.

HUGO K. SCHILLING, Ph.D., Professor of the German Language and Literature.

ALEXIS F. LANGE, Ph.D., Professor of English and Scandinavian Philology.

MAX L. MARGOLIS, Ph.D., Associate Professor of the Semitic Languages.

GEORGE R. NOYES, Ph.D., Assistant Professor of English and Slavic Philology.

HERBERT C. NUTTING, Ph.D., Assistant Professor of Latin.

GUSTAVE FAUCHEUX, B. ès L., B. ès S., Instructor in French.

ALFRED L. KROEBER, Ph.D., Instructor in Anthropology.

PLINY E. GODDARD, Ph.D., Instructor in Anthropology.

UPPER DIVISION COURSES.

1. **General Introduction to the Science of Language.**

Dr. WHEELER.

The essential principles of the life and growth of language; outlines of the science of Phonetics; history of the science of comparative philology; historical and ethnological results of the science; classification of languages; salient characteristics of the various branches of the Indo-European family of languages; methods of investigation.

A course intended for prospective teachers of languages. May be counted as advanced work in any language.

2 hrs., first half-year. Tu Th, 9. Open to Seniors and Graduates.

2. **Indo-European Comparative Grammar.** Dr. WHEELER.

With special reference to the Germanic, Greek, and Latin languages.

A course intended for prospective teachers of languages. May be counted as advanced work in any language.

2 hrs., second half-year. Tu Th, 9. Open to Seniors and Graduates.

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*3. **The Relationship of the Indo-European, Semitic, and Egyptian Families of Languages.** Associate Professor MARGOLIS.

The criteria of the affinity of languages. Agglutinative inflection: the structure of the Indo-European languages. Internal inflection: the structure of the Semitic languages. The Egyptian language. The three groups compared in regard to grammar, phonetic development, and vocabulary.

1 hr., throughout the year. Tu, 4. Knowledge of a Semitic language is not required. Familiarity with one classical language is essential.

4. **Elementary Sanskrit.** Assistant Professor NUTTING.

Perry's Primer, and Lanman's Reader.

2 hrs., throughout the year. M W 11.

*5. **Fundamental Problems of Linguistics.**
Associate Professor MARGOLIS.

On the basis of Delbrück's "Grundfragen der Sprachforschung" interpretation of selected chapters from the works of Humboldt, Steinthal, Geiger, Wegener, von der Gabelentz, Jesperson, Paul, Wundt, Maunther.

1 hr, throughout the year. Th. 3.

COURSES IN OTHER DEPARTMENTS.

North American Languages. [See Anthropology 3A.]
Dr. KROEBER.

***North American Languages.** [See Anthropology 3B.]
Dr. KROEBER.

Experimental Phonetics. [See Anthropology 6A.]
Dr. GODDARD.

***Experimental Phonetics.** [See Anthropology 6B.]
Dr. GODDARD.

Old English. [See English 11A.]
Professor LANGE and Assistant Professor NOYES.

***Modern English Phonology.** [See English 14A.]
Professor LANGE.

History of the English Language. [See English 14B.]
Professor LANGE.

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***Old Norse.** [See English 30.] Professor LANGE.

Historical Grammar of the German Language: Middle High German and Modern German. [See German 28.]
Professor SCHILLING.

Introduction to German Philology. [See German 13B.]
Professor SCHILLING.

Seminar: Linguistic. [See French 27.] Mr. FAUCHEUX.

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*Not to be given in 1905-06.

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SEMITIC LANGUAGES.

JACOB VOORSANGER, D.D., Professor of the Semitic Languages and Literatures.

MAX L. MARGOLIS, Ph.D., Associate Professor of the Semitic Languages.

Students intending to prepare themselves for the ministry or otherwise interested in the work offered by the department are advised, on the basis of a good knowledge of the classical and modern languages, to take in their Junior year Courses 1, 3, 7A, 20, 24, and in their Senior year Courses 4 or 6C, 6B and 10, or 11, or 13. The graduate work provides for a study of the remaining Semitic dialects and for research along the lines of Semitic philology.

UPPER DIVISION COURSES.

*1. **General Introduction to the Study of the Semitic Languages.**
Associate Professor MARGOLIS.

Lectures on the nature and classification of the Semitic languages, and a general survey of the history and literature of the Semites.

1 hr., throughout the year. Tu, 3.

***The Relationship of the Indo-European, Semitic, and Egyptian Families of Languages.** [See Linguistics 3.]
Associate Professor MARGOLIS.

*24. **History of the Semitic Nations to the Rise of Islam.**
Associate Professor MARGOLIS.

Lectures (with topical readings) on the history of Babylonia, Assyria, Syria, Palestine, Arabia in their relations to one another as well as to Iran, Asia Minor, Egypt, and the Occident. For students of the Department of History [see under History].

3 hrs., throughout the year. M W F, 9.

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*Not to be given in 1905-06.

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25. **History of the Mohammedan Countries from the Rise of Islam to the Present Day.** Associate Professor MARGOLIS.

Lectures with assigned readings on special topics. For students of the Department of History [see under History].

3 hrs., throughout the year. M W F, 9.

7A. **Biblical Archaeology.** Professor VOORSANGER.

Lectures on the languages, customs, civil institutions, religions, etc., of the nations and peoples of the Old Testament, with especial reference to the historical development of the religious and political institutions of the Jewish people.

2 hrs., second half-year. Tu, 1-3. Open to all students of the University.

3. **Hebrew.** Associate Professor MARGOLIS.

First Course: Grammatical interpretation of the Book of Ruth, preceded by an outline of Hebrew accidence. Text-books: Hebrew Bible, ed. Hahn; Gesenius's Hebrew Lexicon, ed. Brown-Briggs-Driver.

3 hrs., throughout the year. M W F, 10.

4. **Hebrew.** Associate Professor MARGOLIS.

Second Course: Continued reading of selected portions of the Old Testament. Text-book: Gesenius-Kautzsch, Hebrew Grammar, Clarendon Press.

2 hrs., throughout the year. M W, 11. Prerequisite: Course 3.

20. **Biblical Greek.** Associate Professor MARGOLIS.

Reading of the Synoptic Gospels, with special attention to word-meaning, preceded by an introduction setting forth the place of Biblical Greek in the history of the Greek language.

2 hrs., throughout the year. Tu Th, 1.

GRADUATE COURSES.

23. **Semitic Seminar.** Associate Professor MARGOLIS.

Subject for 1905-06: The Hebrew Ecclesiasticus. Hours to be determined. No credit in units.

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*Not to be given in 1905-06.

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*6B. **Hebrew.** Associate Professor MARGOLIS.

Third Course: A thorough study of certain paragraphs of Gesenius-Kautzsch; exercises in reading unpointed texts and in translation from English into Hebrew.

2 hrs., first half-year. Tu, 10-12.

*6C. **Exegetical Course.**

Associate Professor MARGOLIS.

Philological interpretation of Genesis. Text-book: Gunkel's Genesis, 1901.

2 hrs., throughout the year. M, 3-5.

*10. **Biblical and Targumic Aramaic.**

Associate Professor MARGOLIS.

Selections from the Aramaic portions of the Old Testament and from the Targumim. Text-books: Marti's Grammatik der bibl.-aram. Sprache; Merx, Chrestomathia Targumica.

3 hrs., second half-year. M, 11; W Th, 8.

*11. **Syriac.** Associate Professor MARGOLIS.

Text-book: Brockelmann's Syrische Grammatik.

2 hrs., throughout the year. Tu, 11-1.

*12. **Syriac.** Associate Professor MARGOLIS.

Rapid reading of various authors, with reference to Nöldeke's Syrische Grammatik.

2 hrs., first half-year. M, 2-4.

*12A. **The Semitic Original of the Gospels.**

Associate Professor MARGOLIS.

On the basis of the works of Meyer, Lietzmann, Wellhausen, Dalman.

2 hrs., throughout the year. Tu, 11-1.

*13. **Arabic.** Associate Professor MARGOLIS.

Grammatical interpretation of selected suras, preceded by an outline of Arabic accidence; translation from English. Text-books: Socin's Arabic Grammar; Nallino's chrestomathia corani.

2 hrs., throughout the year. Tu, 2-4.

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*Not to be given in 1905-06.

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*14. **Arabic.** Associate Professor MARGOLIS.

Rapid reading of the Koran, with references to Wright's Arabic Grammar; unpointed texts in Brünnow's Chrestomathy.

2 hrs., throughout the year. M, 9-11.

*5. **Arabic.** Associate Professor MARGOLIS.

First half-year. Interpretation of selected portions of Baidhawi's Commentary on the Koran. Second half-year: Interpretation of the Maullakat (ed. Abel).

2 hrs., throughout the year.

*16. **Ethiopic.** Associate Professor MARGOLIS.

Grammatical interpretation of the Book of Enoch, based on Praetorius's Aethiop. Grammatik.

1 hr., throughout the year. M, 2.

*17. **Assyrian.** Associate Professor MARGOLIS.

Selected inscriptions and the syllabaries in Delitzsch's Assyrische Lesestücke, fourth edition, on the basis of his Assyrian Grammar and Assyrisches Handwörterbuch.

2 hrs., throughout the year. Tu, 9-11.

*18. **Assyrian.** Associate Professor MARGOLIS.

Interpretation of the Code of Hammurabi.

2 hrs., second half-year. M, 2-4.

*19. **Semitic Epigraphy.** Associate Professor MARGOLIS.

Interpretation of selected Phoenician, Aramaic and South-Arabic inscriptions in the Corpus.

3 hrs., throughout the year. Tu, 9-12.

*22. **Coptic: The Sahidic Dialect.** Associate Professor MARGOLIS.

Text-books: Steindorff, Koptische Grammatik; Ciasca, Sacrorum Bibliorum Fragmenta Copto-Sahidica; Peyron, Lexicon.

1 hr., throughout the year. Tu, 2.

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ORIENTAL LANGUAGES.

JOHN FRYER, LL.D., Agassiz Professor of Oriental Languages and Literatures.

YOSHI S. KUNO, M.S., Assistant in Japanese.

CHUN SEEN CHAN, Assistant in Cantonese.

In addition to the lecture and language courses given below, Professor Fryer will offer assistance to students who wish to take up other branches of study connected with China and Japan. He will also act as adviser to students coming from and going to the Orient.

Some of these Group Elective courses are accepted by the College of Commerce and other colleges as part of their regular curriculum or as substitutes for prescribed work. Graduates and undergraduates wishing to take up these Oriental studies, may therefore find it to their advantage to consult with the Dean of their college as to the arrangements that can be made in that direction.

LOWER DIVISION COURSES.

LECTURE COURSES.

1. **The History of China.** Professor FRYER.

3 hrs., first half-year. M W F, 4.

11. **The History of the Laws, Government, and Social Conditions of China.** Professor FRYER.

3 hrs., second half-year. M W F, 4.

*2. **The Philosophies and Religions of China: Confucianism and Taoism.** Professor FRYER.

3 hrs., first half-year. M W F, 4.

*12. **The Philosophies and Religions of China: Buddhism, Mohammedanism and Other Religions.** Professor FRYER.

3 hrs., second half-year. M W F, 4.

*Not to be given in 1905-06.

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*12A. **The Philosophies and Religions of Japan: Ancient and Modern.** Professor FRYER.

3 hrs., first half-year. M W F, 4.

The above five lecture courses form a series; but any of them may be taken singly. They are adapted for students in general, but particularly for those who look forward to relations with the Orient.

LANGUAGE COURSES.

3. **Elementary Study of Kuan-hua.** Professor FRYER.

Introduction to Kuan-hua, the language spoken by the officials and about four-fifths of the population of China. Series of progressive elementary lessons and exercises in reading, speaking, translation, and composition.

6 hrs., throughout the year. M W F, 9-11.

4. **Advanced Study of Kuan-hua.** Professor FRYER.

Series of progressive advanced lessons and exercises in reading, speaking, translation and composition. Selections from Kuan-hua literature.

6 hrs., throughout the year. M W F, 8-10. Prerequisite: Course 3.

7. **Elementary Study of the Cantonese Dialect.** Mr. CHAN.

Introduction to Cantonese, the dialect spoken by the greater part of the Chinese who emigrate to America, Australia, and other countries. Series of progressive elementary lessons and exercises in speaking, reading, translation, and composition.

6 hrs., throughout the year. M W F, 9.

8. **Advanced Study of the Cantonese Dialect.** Mr. CHAN.

Series of progressive advanced lessons and exercises in speaking, reading, translation, and composition. Selections from literature in the Cantonese dialect.

6 hrs., throughout the year. Tu (2 hrs.) Th, 1. Prerequisite: Course 7.

9. **Elementary Study of the Japanese Language.** Mr. KUNO.

Introduction to the Japanese language, with the use of both the Katakana and Hiragana forms of letters. Series of progressive elementary lessons and exercises in reading, speaking, and writing.

3 hrs., throughout the year. M W F, 9.

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9A. **Second Year of Elementary Japanese.** Mr. KUNO.

This is a continuation of the preceding course, introducing the use of the common Chinese Characters; with selections from modern Japanese writers.

3 hrs., throughout the year. M W F, 8.

9B. **Elementary Japanese: Double Series.** Mr. KUNO.

This course combines the work of Courses 9 and 9A, and is intended for beginners who wish to prepare in one year for Course 10.

6 hrs., throughout the year.

10. **Advanced Study of the Japanese Language.** Mr. KUNO.

Series of progressive advanced lessons and exercises in reading, speaking, translation, and composition, with selections from the best Japanese literature.

6 hrs., throughout the year. M W Th, 11. Prerequisite: Course 9B.

UPPER DIVISION COURSES.

LECTURE COURSES.

1A. **The Commerce of China and Japan: Historical Features.** Professor FRYER.

3 hrs., first half-year. M W F, 1.

1B. **The Commerce of China and Japan: Geographical Features.** Professor FRYER.

3 hrs., second half-year. M W F, 1.

*11A. **The Commerce of China and Japan: Economic Features.** Professor FRYER.

3 hrs., first half-year. M W F, 1.

*11B. **The Commerce of China and Japan: Political Features.**

3 hrs., second half-year. M W F, 1.

The above four lecture courses form a series; but any of them may be taken singly. They are adapted for students in general, but particularly for those in the College of Commerce.

2A. **Chinese Literature.** Professor FRYER.

A course of lectures on English translations of the principal books of China.

1 hr., second half-year. M, 11.

*Not to be given in 1905-06.

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2B. **Chinese Language.** Professor FRYER.

A course of lectures on the principal features of the Chinese spoken and written language.

1 hr., first half-year. M, 11.

LANGUAGE COURSES.

5. **Elementary Study of Wen-li.** Professor FRYER.

The classical written language of the empires of China and Japan. Progressive selections from various kinds of current literature and official documents, with exercises in translation and composition. Selections from the Four Books.

The Cantonese section is taught by Mr. CHAN and the Japanese by Mr. KUNO.

6 hrs., throughout the year. Prerequisite: Courses 4, 8, or 10.

6. **Advanced Study of Wen-li.** Professor FRYER.

Progressive selections from the higher classical literature, with exercises in translation and composition. Selections from the Five Classics, essays, technical books, and poetry.

The Cantonese section is taught by Mr. CHAN and the Japanese by Mr. KUNO.

6 hrs., throughout the year. Prerequisite: Course 5.

GRADUATE COURSES.

14. **Oriental Seminar.** Professor FRYER.

Philological problems relating to the languages, literature, history and other subjects connected with the Far East.

2 hrs., first half-year. Tu, 4-6. Prerequisite: Sufficient preparatory work in the Oriental or other departments of the University.

15. **Oriental Seminar.** Professor FRYER.

International problems relating to commercial, diplomatic, educational and other branches of intercourse with the Far East.

2 hrs., second half-year. Tu, 4-6. Prerequisite: Same as Course 14.

Courses 14 and 15 are open to properly qualified Seniors. They may be repeated indefinitely, without duplication of work.

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GREEK.

EDWARD B. CLAPP, Ph.D., Professor of the Greek Language and Literature.

ISAAC FLAGG, Ph.D., Associate Professor of Greek.

*JAMES T. ALLEN, Ph.D., Assistant Professor of Greek.

WILLIAM S. FERGUSON, Ph.D., Assistant Professor of Greek and Roman History.

HENRY W. PRESCOTT, Ph.D., Assistant Professor of Classical Philology.

IVAN M. LINFORTH, M.A., Instructor in Greek.

ALICE MABYN CHAPMAN, A.B., Reader in Greek.

ALBIN PUTZKER, M.A., Professor of German Literature.

Teachers' Certificates. Students will be recommended for teachers' certificates who shall have completed with credit Course 6 in addition to twenty-one units of University work in Greek.

LOWER DIVISION COURSES.

Course A is designed for students who desire to begin the study of Greek after entering the University. Course B is provided for students who have credit for Matriculation Subject 8 only. Courses 1 and 2 constitute the regular Freshman work in Greek and are prescribed for the degree of Bachelor of Arts.

A. **Elementary Greek; Xenophon's Anabasis.** Mr. LINFORTH.

5 hrs., throughout the year. M Tu W Th F, 3. [If taken as work of the Upper Division, this course counts as three units each half-year, instead of five.]

Thorough drill in the essentials of Greek Grammar, with systematic study of vocabulary and practice in the writing of easy Greek; Xenophon's Anabasis, Books I-II, careful study of selected passages, with rapid reading of more extended portions. This course is intended as an equivalent for Matriculation Subject 8, and may be counted for prescribed or free elective work, in all colleges except the College of Letters, subject to their regulations, by students who enter without Greek.

*Absent on leave, 1905-06.

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B. **Attic Prose; Homer's Iliad.** Mr. LINFORTH.

3 hrs., throughout the year. M W F, 2. Prerequisite: Greek A, or Matriculation Subject 8.

The course covers the same ground as Matriculation Subject 9, and is provided for students who have completed only Course A. It may be counted for free elective work in the College of Letters by students who enter with the minimum of Greek, and for prescribed or free elective work in all colleges, subject to their regulations. Students who take this course in their Freshman year should take Courses 1 and 2 in their Sophomore year. It is not impossible for such students to do advanced work in Greek and even to receive a teacher's certificate at graduation.

Course B may be divided at the mid-year. The work of the first term [B i] includes the reading of Books iii and iv of the Anabasis, with careful study of such essentials of the language as the significance of the inflectional endings, the ordinary particles, and the word-order; and with considerable practice in writing Greek. The work of the second term [B ii] is devoted to mastering the elements of the Homeric dialect, and reading Books i-iii of the Iliad.

1. **Homer's Iliad—Books xix-xxiv.** Mr. LINFORTH.

The chief object sought in this course is to gain the ability to read Homer with accuracy and ease. To this end systematic study is given to the Homeric vocabulary; this accompanies a careful study of selected passages and rapid reading of more extended portions. Some attention is given, also, to the discussion of Homer's style and subject-matter, and of his influence upon literature.

3 hrs., first half-year. M W F, Section I, 8; II, 9.

2. **Plato's Apology and Crito.** Professor CLAPP and Mr. LINFORTH.

This course is intended to carry forward the student's training in the vocabulary, syntax, and style of Attic prose, without, however, neglecting the historical and literary questions involved in the study of the Apology.

3 hrs., second half-year. M W F, Section I, 8; II, 9.

FREE ELECTIVE COURSES IN THE LOWER DIVISION.

The following one-hour courses are intended to furnish additional training, besides the required work, to students in the Freshman and Sophomore classes who desire to give special attention to

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Greek, and to acquire as early as possible the ability to read Greek prose in the order of the thought at sight. Students who desire to add to the normal 12 units of Greek in the Lower Division may elect Course 13 in conjunction with 1, 14 with 2, 15 with 7, and 16 with 8 or 9.

13. **Greek Historical Prose: Arrian, Dion of Prusa, Lucian.**
Associate Professor FLAGG.

Rapid reading, with frequent written tests in translation at sight.

1 hr., first half-year. Tu, 11. Prerequisite: Matriculation Subject 9, or Greek B.

14. **Greek Historical Prose** [a continuation of Course 13].
Associate Professor FLAGG.

1 hr., second half-year. Tu, 11. Prerequisite: Matriculation Subject 9, or Greek B.

15. **Greek Historical Prose: Thucydides, Xenophon.**
Associate Professor FLAGG.

Rapid reading, with frequent written tests in translation at sight.

1 hr., first half-year. Th, 11. Prerequisite: Course 2.

16. **Greek Historical Prose** [a continuation of Course 15.]
Associate Professor FLAGG.

1 hr., second half-year. Th, 11. Prerequisite: Course 1.

7. **Introduction to Greek Tragedy.** Professor CLAPP.

The Alcestis of Euripides, and the Prometheus of Aeschylus, with practice in the intelligent reading of the trimeters and anapaests. In connection with this course a series of informal lectures will be given, on the representation of Greek dramas, and on the artistic form and structure of Greek Tragedy.

3 hrs., first half-year. M W F, 8. Prerequisite: Courses 1 and 2, or first or second grade of scholarship in Course 2.

8. **Herodotus.** Associate Professor FLAGG.

Rapid reading, with frequent written tests in translation at sight. The course in Herodotus may be elected two years in succession without repetition of subject-matter.

3 hrs., second half-year. M W F, 10. Prerequisite: Course 7.

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20. **The Medea and the Iphigenia Among the Taurians of Euripides.** Mr. LINFORTH.

3 hrs., second half-year. M W F, 10. Prerequisite: Course 7.

12. **Homer.** Associate Professor FLAGG.

Rapid reading, with frequent written tests in translation at sight. In 1905-06, the Iliad. This course may be elected two years in succession without repetition of subject-matter.

3 hrs., first half-year. M W F, 10. Prerequisite: Courses 1 and 2, or first or second grade of scholarship in Course 2.

COURSES IN GREEK COMPOSITION.

A series of four courses in writing, progressively arranged. Each weekly exercise is based directly upon some prescribed passage of Xenophon or Plato; and to meet the test of writing a true reading power is demanded. Courses 5 and 6 are open to students who have completed with credit Courses 3 and 4. Since these courses are necessary for the recommendation for a teacher's certificate, students are advised to take up Course 3 not later than the beginning of Sophomore year.

3. **The Writing of Attic Prose.** Associate Professor FLAGG.

This course is open to all students of Greek, with the consent of the instructor; but in order to be promoted to Course 4 the candidate must evince by his written performances a tolerably sure mastery of the ordinary forms and fundamental principles of the language.

1 hr., first half-year. S, 8.

4. **The Writing of Attic Prose.** Associate Professor FLAGG.

A continuation of Course 3.

1 hr., second half-year. S, 8. Prerequisite: First or second grade of scholarship in Course 3.

5. **The Writing of Attic Prose.** Associate Professor FLAGG.

1 hr., first half-year. S, 9. Prerequisite: First or second grade of scholarship in Course 4.

6. **The Writing of Attic Prose.** Associate Professor FLAGG.

Translation from Latin into Greek.

1 hr., second half-year. S, 9. Prerequisite: First or second grade of scholarship in Course 5.

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UPPER DIVISION COURSES.

Courses 21 to 46 are open to graduates and undergraduates who have completed Courses 1, 2, and 7, together with the special prerequisites named under the several courses. Courses 1, 2, and 7, together with 8 or 9, constitute the regular introduction to Upper Division work in Greek.

21. **The Oedipus Tyrannus and the Antigone of Sophocles.** (G.E.)
Professor CLAPP.

2 hrs., first half-year. Tu Th, 9.

36. **The Fourth Book of Thucydides.** (G.E.)
Associate Professor FLAGG.

2 hrs., first half-year. Tu Th, 10. Additional prerequisite: Course 6.

25. **Plato.** (G.E.) Professor CLAPP.

Selections from the Gorgias, Phaedo, Republic, and other dialogues.

2 hrs., second half-year. Tu Th, 9.

30. **Theocritus, Bion, and Moschus.** (G.E.)
Assistant Professor PRESCOTT.

Reading of the bucolic idylls and the mimes of Theocritus, with comparative study of the idylls of Bion and Moschus, and of the mimes of Herondas. Lectures on the beginnings and the development of Greek bucolic poetry.

3 hrs., second half-year. M W F, 2.

46. **The Persians and the Seven against Thebes of Aeschylus.** (G.E.)
Associate Professor FLAGG.

2 hrs., second half-year. Tu Th, 10. Additional prerequisite: First or second grade of scholarship in Course 5.

45. **Modern Greek.** (G.E.) Professor PUTZKER.

An introduction to the literary and spoken language of the Greeks of to-day. Selected readings and exercises in conversation.

2 hrs., throughout the year. Tu Th, 11.

COURSES IN OTHER DEPARTMENTS.

Biblical Greek. [See Semitic 20.] Associate Professor MARGOLIS.

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Greek History and Inscriptions.

The following courses in Greek History and Inscriptions, given under the supervision of the Departments of History and Political Science, are of special importance to students of Greek. For details, prerequisites, etc., see under the departments referred to.

History of Greece. [See History 53.]
Assistant Professor Ferguson.

***Greek Epigraphy.** [See History 82.]
Assistant Professor Ferguson.

Seminary in Ancient History. [See History 107.]
Assistant Professor Ferguson.

Greek Institutions. [See Political Science 6.]
Assistant Professor Ferguson.

GRADUATE COURSES.

The following courses are intended for graduate students only, and one or more of them will be given each year, according to the needs of students. Many graduate students will find it profitable to take also some of the Upper Division Courses for undergraduates. [Courses 21-46.]

51. **The Republic of Plato.** Professor Clapp.

A careful study of the whole work, with some introduction to textual criticism and scientific interpretation. The larger edition of Adam [two volumes, eleven dollars, Macmillan] is recommended, and should be ordered early.

4 hrs., throughout the year. W F, 4-6.

*54. **The "Griechisches Lesebuch" of Wilamowitz-Moellendorff.**
Professor Clapp.

†52. **The Odes and Fragments of Pindar.** Professor Clapp.

*53. **Aeschylus.** Assistant Professor Allen.

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*Not to be given in 1905-06.
†To be given in 1906-07.

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LATIN.

WILLIAM A. MERRILL, Ph.D., L.H.D., Professor of the Latin Language and Literature.

LEON J. RICHARDSON, A.B., Assistant Professor of Latin.

CLIFTON PRICE, Ph.D., Assistant Professor of Latin.

HERBERT C. NUTTING, Ph.D., Assistant Professor of Latin.

HENRY W. PRESCOTT, Ph.D., Assistant Professor of Classical Philology.

JOHN W. BASORE, Ph.D., Instructor in Latin.

CHARLES J. O'CONNOR, Ph.D., Instructor in Latin.

ALEXANDRA G. SMITH, A.B., Assistant in Latin.

Courses 5 to 10, inclusive, may be counted for the prescribed or elective work in the Colleges of General Culture, and are planned especially for students in the Lower Division; they may, however, be taken in the Upper Division, but not as advanced work. Four courses, and no more, may be selected from them; and, with the exception of Course 5B, they may not be taken in conjunction with, or subsequent to, Courses 12 to 81.

Teachers' Certificates. The requirements for recommendation by the department are normally (*a*) 15 units of advanced work in Latin, which must include Course 4, and must be distributed in such a way as to show acquaintance with Ante-Classical and Imperial Latin, and with poetry as well as prose; (*b*) Greek, Course A (or its equivalent); (*c*) a reading knowledge of German. Candidates should consult the head of the departments at their earliest opportunity.

LOWER DIVISION COURSES.

A. **Virgil's Aeneid.** Dr. O'CONNOR.

3 hrs., throughout the year. Tu Th S, 8. Prerequisite: Matriculation Subject 7*a*. Six books of the Aeneid will be read. May be counted for prescribed or elective work. It is identical with Matriculation Subject 7*b*.

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1. **Cicero and Pliny.** Assistant Professors PRICE and NUTTING, Drs. BASORE and O'CONNOR.

The Cato Maior of Cicero and the Letters of Pliny. Systematic study of syntax and synonyms. Practice in reading aloud and in translation at hearing, and in pronunciation, phrasing and emphasis.

3 hrs., either half-year. First half-year, five sections. M W F, 8, 10, 2; Tu Th S, 9. Second half-year, one section. M W F, 3. Prerequisite: Matriculation Subject 7*b* or Course A. Prescribed in the College of Letters. May be counted for prescribed or elective work in the Colleges of Social and Natural Sciences, and as a free elective in other colleges.

2. **Livy and Plautus.** Assistant Professors PRICE and PRESCOTT, Drs. BASORE and O'CONNOR.

Selections from Livy, and rapid reading of one play of Plautus.

3 hrs., either half-year. First half-year, one section. M W F, 9. Second half-year, five sections. M W F, 8, 10, 2; Tu Th S, 9. Prerequisite: Course 1. Prescribed in the College of Letters; may be counted for prescribed or elective work in the Colleges of Social and Natural Sciences, and as a free elective in other colleges.

5. **Horace and Virgil.**

Assistant Professors RICHARDSON and PRICE and Dr. BASORE.

The Odes and Epodes of Horace. Private reading of selections from Virgil's Aeneid, vii-xii.

3 hrs., first half-year. Three sections. M W F, 9. Tu Th S, 9, 10. Prerequisite: Course 2, completed or in progress.

Courses 8, 9, and 10 will each be limited to thirty students.

8. **Cicero, Letters; Roman Literature.**

Assistant Professor RICHARDSON.

Selected letters of Cicero. Fowler's Roman Literature.

3 hrs., second half-year. Tu Th S, 10.

9. **Catullus; Ovid.** Assistant Professor PRESCOTT.

Selections from Catullus; Ovid's Heroides for private reading.

2 hrs., second half-year. Tu Th, 9. Prerequisite: Course 5.

10. **Horace, Satires and Epistles.** Assistant Professor PRICE.

A course in rapid reading.

2 hrs., second half-year. M W 9. Prerequisite: Course 5.

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COURSES IN SIGHT TRANSLATION.

1B. **Sight Translation I.** Assistant Professor RICHARDSON.

Practice in reading at sight from easy authors, with incidental interpretation.

2 hrs., throughout the year; 1 unit each half-year. M W, 2. Prerequisite: Course 1, completed or in progress. This course may be counted for prescribed or elective work. It is intended especially for Freshmen, but may be taken by more advanced students who do not pursue other courses in Latin.

5B. **Sight Translation II.** Assistant Professor PRESCOTT.

Translation at sight of more difficult Latin.

2 hrs., throughout the year; 1 unit each half-year. M W, 3. Prerequisite: Course 5, completed or in progress. This course is intended especially for Sophomores, but may be taken by more advanced students, whether pursuing other courses in Latin or not, but not as advanced work of the Upper Division.

49. **Sight Translation III.** Professor MERRILL.

Exercises in translating at sight selections from the prose literature of the Empire. Private reading of selections from Imperial Latin prose.

3 hrs., first half-year. M W F, 11. Prerequisite: One course selected from Courses 5B to 10. It may be counted for advanced work in the Upper Division.

COURSES IN LATIN WRITING.

B. **Latin Composition.** Dr. O'CONNOR.

1 hr., throughout the year; ½ unit each half- year. M, 3. Prerequisite: Matriculation Subject 6*b*. It may be counted for prescribed or elective work, and is identical with Matriculation Subject 7*c*[1].

C. **Latin Composition.** Assistant Professor PRICE.

1 hr., throughout the year; ½ unit each half-year. Tu, 2. Prerequisite: Matriculation Subject 7*c*[1] or Course B. It may be counted for prescribed or elective work, and is identical with Matriculation Subject 7*c*[2].

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3. **Latin Composition, I.**

Assistant Professor NUTTING and ———.

Exercises in writing Latin prose narrative.

1 hr., throughout the year. Three sections. Th, 1, 2, 3. Prerequisite: Matriculation subject *7c*, or Course C.

4. **Latin Composition, II.**

Assistant Professor PRESCOTT and Miss SMITH.

Writing Latin in periodic style. Retranslation of English versions of Latin and Greek authors and of selections from English classic writers.

1 hr., throughout the year. Three sections. Tu, 1, 2, 3. Prerequisite: Satisfactory completion of Course 3. This course may be counted as advanced work if taken in the Upper Division.

12. **Latin Composition, III.** Assistant Professor RICHARDSON.

Extended idiom; translation of English masterpieces. Training in Latin expression and construction.

1 hr., throughout the year. F, 2. Prerequisite: Satisfactory completion of Course 4. This course may be counted for advanced work.

13. **Latin Composition, IV.** Dr. BASORE.

Original Latin composition: Practice in the forms of narrative and argumentation, involving topics assigned for research.

1 hr., throughout the year. Hour determined by consultation with the instructor. Prerequisite: Satisfactory completion of Course 12. This course may be counted for advanced work.

UPPER DIVISION COURSES.

The Upper Division Courses presume a working knowledge of German and French. The specific prerequisite for all of them is one course selected from Courses 5B to 10.

16. **Ovid; Propertius.** Assistant Professor RICHARDSON.

Ovid, Fasti; Propertius, Book iv; Roman religion and folklore, with modern parallels.

3 hrs., first half-year. Tu Th S, 11.

17. **Virgil's Georgics.** Assistant Professor RICHARDSON.

Reading, translation, and exegesis. Theory of the Virgilian hexameter, and the art of reading classical Latin poetry.

3 hrs., second half-year. Tu Th S, 9.

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18. **Tacitus, Histories.** Assistant Professor NUTTING.

Selections from the Histories of Tacitus.

3 hrs., second half-year. Tu Th S, 8.

19. **Patristic Latin.** Professor MERRILL.

St. Augustine, De Civitate Dei, and the Hymn Writers, with particular reference to the language.

3 hrs., first half-year. M W F, 10.

24. **Early Latin.** Professor MERRILL.

A selection of inscriptions, together with the fragments of the early literature in prose and poetry. Lindsay's Inscriptions; Merry's Fragments.

3 hrs., second half-year. M W F, 10.

25B. **Lucretius.** Dr. BASORE.

Criticism and interpretation of the poem and outline of the Epicurean system.

3 hrs., second half-year. M W F, 9.

26. **Quintilian, Books x and xii.** Assistant Professor RICHARDSON.

Literary criticism among the Romans.

3 hrs., first half-year. M W F, 3.

31. **Roman Satire.** Dr. BASORE.

Lectures on the history of Roman Satire, with translation and exegesis of selected satires from Ennius to Juvenal.

3 hrs., first half-year. M W F, 9.

32. **Bucolic Poetry.** Dr. BASORE.

The Bucolics of Virgil, Calpurnius and Nemesianus, with emphasis upon Virgil's relation to Theocritus.

2 hrs., second half-year. M W, 4.

35. **Teachers' Training Course.** Assistant Professor RICHARDSON.

Problems in teaching Latin; estimates of text-books; visiting of local schools. Examinations of questions in pronunciation and syntax; exercises in teaching preparatory authors.

3 hrs., second half-year. M W F, 3. Additional prerequisite: Senior or Graduate standing.

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38. **Cicero's Correspondence.** Assistant Professor NUTTING.

A study of the history and politics of Cicero's time, with reference to his procedure. Private study of some one of Cicero's correspondents, with data from the sources.

3 hrs., second half-year. M W F, 1.

39. **Roman Comedy.** Assistant Professor PRESCOTT.

The Mostellaria, Captivi, and Rudens of Plautus, and his relation to the development of ancient comedy.

3 hrs., first half-year. M W F, 8.

40A. **Latin Grammar: Forms; Syntax of the Noun.**
Assistant Professor NUTTING.

A study of the forms of the Latin language, based on a textbook; lectures on the syntax of the cases.

2 hrs. first half-year. M W, 2. Additional prerequisite: Course 4.

40B. **Latin Grammar: Syntax of the Verb.**
Assistant Professor NUTTING.

A survey of some of the important problems of Latin syntax. Preparation of assigned work and lectures.

2 hrs., second half-year. M W, 2. Additional prerequisite: Course 4.

41. **Palaeography and Text Criticism.** Assistant Professor PRICE.

Lectures on palaeography and practice in reading fac-similes and original manuscripts. Practical exercises conducted by students.

3 hrs., second half-year. Tu, 3; Th, 3, 4.

51. **Cicero: Tusculan Disputations.** Assistant Professor NUTTING.

Criticism and interpretation.

3 hrs., first half-year. Tu Th S, 9.

53. **Roman Private Life.** Dr. O'CONNOR.

Lectures illustrated from the antiquities of Pompeii and Rome. Collateral reading with reports.

2 hrs., first half-year. Tu Th, 10.

54. **Roman Topography.** Dr. O'CONNOR.

Illustrated lectures on the topography and monuments of Ancient Rome. Collateral reading and reports.

2 hrs., second half-year. Tu Th, 10.

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56. **Roman Tragedy.** Professor MERRILL.

A brief survey of the development of Roman Tragedy, and reading of Seneca's Tragedies, with some attention to his Greek sources and his influence on modern literature.

3 hrs., second half-year. M W F, 11.

60A. **Roman Epigraphy.** Assistant Professor PRICE.

Lectures on Epigraphy, and exercises in interpretation of Inscriptions in the Corpus and from squeezes and fac-similes.

3 hrs., first half-year. Tu, 1; Th, 1, 2.

60B. **Roman Epigraphy.** Assistant Professor PRICE.

Lectures on Epigraphy, and exercises in interpretation of Inscriptions in the Corpus and from squeezes and fac-similes.

3 hrs., second half-year. Tu, 1; Th, 1, 2.

66. **Catiline's Conspiracy.** Assistant Professor NUTTING.

A study from the sources, of the causes and events of Catiline's Conspiracy. The data will be collected in part through private reading.

3 hrs., first half-year. M W F, 1.

68. **Roman Municipal Administration.** Dr. O'CONNOR.

Lectures, illustrated from the ruins of Pompeii and Rome, on the administration in the ancient city of public works and utilities, fire and police protection, the markets, baths, and theatres.

2 hrs., second half-year. M W, 4.

70. **Epic Poetry of the Silver Age.** Dr. BASORE.

Readings from Lucan, Valerius Flaccus and Statius, with special consideration of the technique, sources and subjects of the later epic.

3 hrs., first half-year. Tu Th, 3; S, 10.

73. **The Technique of Virgil's Aeneid.**

Assistant Professor PRESCOTT.

Virgil's sources, his methods of using them, and his own contributions; character-treatment; structure and motivation of action; technique of narrative and description; unity of composition; effects produced. Lectures, collateral reading, and reports.

3 hrs., first half-year. M W F, 4.

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75. **Social Forces in the Literature of the Silver Age.**
Assistant Professor PRESCOTT.

The social life of the first century A.D. as it appears in the literature. Lectures, and organization by each student of the material in some one author of the period.

3 hrs., second half-year. M W F, 8.

76. **The Roman Novel.** Dr. BASORE.

Lectures on the history and characteristics of Latin prose fiction, with selected readings from Petronius and Apuleius.

3 hrs., second half-year. Tu Th S, 11. Additional prerequisite: Senior or Graduate standing.

80. **The Sources of Roman Law.** Professor MERRILL.

Brun's Fontis Iuris Romani. Reading and lectures.

2 hrs., first half-year. Tu Th, 11. The previous consent of the instructor must be obtained before registration in this course.

81. **Select Titles from the Digest.** Professor MERRILL.

Titles 18, 19, 20, 21, and 13.6, being part of the law of contracts.

2 hrs., second half-year. Tu Th, 11. The previous consent of the instructor must be obtained before registration in this course. Courses 80 and 81 are also listed in the Department of Jurisprudence.

GRADUATE COURSES.

30. **Latin Verse Composition.** Assistant Professor RICHARDSON.

Latin hexameters, elegiacs, sapphics, asclepiads, and alcaics.

Qualified Seniors who have completed Course 12 may be admitted on consultation with the instructor.

1 hr., throughout the year. M, 4.

34. **Latin Seminary.** Professor MERRILL.

Criticism and interpretation of the philosophical works of Cicero. Training in philological method and in textual criticism. Students should provide themselves with Müller's edition of Cicero, Part IV, Vols. 1-3, or with Baiter's edition, Vols. 6-8.

3 hrs., throughout the year. Th, 4; S, 10-12. Required of all candidates for higher degrees who make Latin their major subject.

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59. **Seminary in Latin Syntax.** Assistant Professor NUTTING.

The subject for investigation will be the Conditional Sentence. The work of the first half-year will be mainly the collection of material; the second half will be devoted to seminary exercises. Open to qualified Seniors with permission of the instructor.

2 hrs., throughout the year.

Elementary Sanskrit. [See Linguistics 4.]

Assistant Professor NUTTING.

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ENGLISH.

CHARLES MILLS GAYLEY, Litt.D., LL.D., Professor of the English Language and Literature.

CORNELIUS B. BRADLEY, M.A., Professor of Rhetoric.

ALEXIS F. LANGE, Ph.D., Professor of English and Scandinavian Philology.

WILLIAM D. ARMES, M.L., Assistant Professor of English Literature.

THOMAS F. SANFORD, A.B., Assistant Professor of English Literature.

CHAUNCEY W. WELLS, A.B., Assistant Professor of English Composition.

GEORGE R. NOYES, Ph.D., Assistant Professor of English and Slavic Philology.

MARTIN C. FLAHERTY, Ph.B., Assistant Professor of Forensics.

WALTER M. HART, Ph.D., Assistant Professor of English Philology.

BENJAMIN P. KURTZ, A.B., Instructor in English.

CHARLES D. VON NEUMAYER, Instructor in Public Speaking.

LUCY SPRAGUE, A.B., Assistant in English.

BEVERLY S. ALLEN, A.B., Reader in English Literature.

(Six Readers in Composition.)

LOWER DIVISION COURSES.

Prescribed and Prerequisite Courses. Regular students who undertake the work of this department must have credit for entrance English A, and 1 or 14, and special students must have credit for all three requirements. Of the University courses, 1 and 2 must precede those listed under Upper Division Courses. Courses 1A, and 1B or 1C, fulfill the prescription for the Colleges of Letters, Social Sciences, and Natural Sciences, Commerce, Agriculture, and Chemistry. In the last three Colleges, however, the prescription may be satisfied by taking 1A and three units from Courses 3, 4, and 5. Courses 1, 3, 4, and 5 are especially adapted to the needs of students in the Colleges of Commerce and Applied Science.

Elective Courses. Courses listed 3 to 5, inclusive, are open to all students, subject only to the restrictions stated under each course. Course 11A also may be taken as a Lower Division elective by Sophomores who have the permission of the instructor.

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UPPER DIVISION COURSES.

Group or Major Courses. The Major Subject may be made from any of the Upper Division Courses (marked G.E.), but it must include at least one dealing with the earlier history of our language and literature, chosen from those under 11, 12, 13, 14. Students are recommended, but not required, to include also in the list a course in composition, 6-8; a course in the theory of literature, 9-10; 26; and one in modern authors, periods or movements, 15 to 23.

Elective Courses. Courses 6A, 7D, 7E, 7F, 8A, 8B, 11C, 18A, 21A, 22A are open to all students in the Upper Division, subject only to the restrictions stated in each case. Any other study, no matter where listed, may, of course, be pursued as Elective by students in the Upper Division who have fulfilled the specific requirements.

For Teachers' Certificates the requirement in units is the same as for Group Elective; but, beginning with December, 1905, a Final Examination will, in addition, be required. The emphasis will be laid, not so much on detailed information as (*a*) on grasp of the subject of English in its twofold aspect—the language and the literature—and (*b*) on scholarly methods and workmanship. The candidates will be expected to satisfy the Department of English that they have:—

1. A scholarly acquaintance wth each of the three main periods of the English language and with the history of its development to the present time.

2. Familiarity, obtained at first hand, with the chief masterpieces of English literature, with the history of its development, and with the principles and methods of historical study;

3. Satisfactory special knowledge of one of the greater authors or of one of the main literary movements;

4. Training in the principles of poetry and prose, and the methods of criticism requisite to the advanced study of literature;

5. Skill in organizing and presenting thought, orally and in writing.

Candidates are warned against supposing that the purpose of the examination can be attained by mere accumulation of courses in English. It will always be presupposed, however, that candidates presenting themselves for examination have an equivalent of 27 units of English to their credit.

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LOWER DIVISION COURSES.

1. General Composition.

Fortnightly compositions in each of the prose forms in turn. Regular appointments for individual criticism. Analysis of prose specimens. Impromptu writing in class once a fortnight. This course must precede Courses 2, 3A and 3B, and the Group Elective.

1A. Narration and Description.

Professor BRADLEY, Assistant Professors WELLS and FLAHERTY, Mr. KURTZ, Miss SPRAGUE and Readers.

3 hrs., first half-year. Eleven sections. Sections I, 11, and III, (Mr. Kurtz) M W F, 8, 9, 10; Sections IV, V, and VI, (Assistant Professor WELLS) M W F, 1, 2, 3; Sections VII and VIII, (Assistant Professor FLAHERTY) Tu Th S, 9, 10; Sections IX and X, (Miss SPRAGUE) Tu Th S, 10, 11; Section XI, (Professor BRADLEY) Tu Th S, 9.

1B. Exposition.

Professor BRADLEY, Assistant Professors WELLS and FLAHERTY, Mr. KURTZ, Miss SPRAGUE and Readers.

3 hrs., second half-year. Sections as in the first half-year; save Section VIII, for which see Course 1C.

1C. The Foundations of Argumentative Writing.

Assistant Professor FLAHERTY and a Reader.

Principles, methods and practice.

3 hrs., second half-year. One section, Tu, Th, S, 10. Optional with 1B, but limited to students approved by the instructor.

2. General History of English Literature.

The development of English literature from the Beowulf to the death of Scott. An historical outline, supplemented by the study of representative masterpieces. Lectures, recitations, discussions and written exercises. This course must precede Group or Major Courses.

2A. From the Beginnings to Milton.

Assistant Professors ARMES, SANFORD, and HART.

3 hrs., first half-year. Seven sections. Sections I, II, III, M W F, 9, 2, 3 (Assistant Professor ARMES); Sections IV, V, VI, Tu, Th, S, 8, 10, 11 (Assistant Professor SANFORD); Section VII, M W F, 8 (Assistant Professor HART).

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2B. From Milton to the Death of Scott.

Assistant Professors ARMES, SANFORD, and HART.

3 hrs., second half-year. Seven sections as in 2A.

3A. Analysis of Argumentative Masterpieces.

Assistant Professor FLAHERTY.

A careful inquiry into the methods of Burke, Webster, and other masters of debate, with study of the political principles involved in the subjects under discussion.

2 hrs., first half-year. Tu Th, 11. Open to students after the Freshman year who have had 1C. Courses 3A and 3B are preliminary to 7A.

3B. Analysis of Argumentative Masterpieces.

Assistant Professor FLAHERTY.

Continuation of 3A.

2 hrs., second half-year. Tu Th, 11.

3C. Principles of Vocal Expression. Mr. VON NEUMAYER.

Technique of speech and delivery; oral reading.

2 hrs., first half-year. Tu Th, 10. Courses 3C and D are open to students of any year. They are intended only for prospective debaters, 7D, E, and F.

3D. Principles of Vocal Expression. Mr. VON NEUMAYER.

Continuation of 3C.

2 hrs., second half-year.

3E. Oral Interpretation. Mr. VON NEUMAYER.

The reading of English and American poetry and prose. Training in vocal expression.

2 hrs., first half-year. Tu Th, 1. Prerequisite: Course 1.

3F. Oral Interpretation. Mr. VON NEUMAYER.

Continuation of 7D.

2 hrs., second half-year. Tu Th, 1.

4. Great Books. Professor GAYLEY and a Reader.

A discusson of certain foreign masterpieces in their bearing upon English literature. Lectures, reading and reports. Since the discussion extends through four years, the course may be taken four times. Series A, second half-year 1903-04, and first half-year 1904-05, Books of Wisdom; Series B, second half-year 1904-05, and first half-year, 1905-06, Epics;

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Series C, 1906-07, Dramas and other Poems; Series D, Biographies and Histories.

1 hr., either half-year. F, 4. In the first half of each year this course is open to all students. In the second half it is limited to students in the Colleges of Applied Science and Commerce, and such others as have the permission of the instructor.

5A. **Scientific Prose.** Assistant Professor HART.

Analysis of masterpieces of scientific exposition. Practice in the collection and interpretation of material, and in oral and written composition.

2 hrs., first half-year. Tu Th, 8. Free elective for students who have at least Sophomore standing.

5B. **The Short Story.** Assistant Professor HART.

Lectures on its technique, and on the relation of the type to ballad, folk-tale, *lai, novella,* and essay. Reading of American, English, and, in translation, foreign, masterpieces.

2 hrs., second half-year. Tu Th, 8. Free Elective for all students who have at least Sophomore standing.

UPPER DIVISION COURSES.

FOR JUNIORS AND SENIORS.

ORAL AND WRITTEN COMPOSITION.

6. **Composition Under Individual Training and Direction.**

6A. **Studies in Style.** Mr. KURTZ.

Lectures; the reading and analysis of masterpieces.

2 hrs., second half-year. Tu Th, 1.

6B. **Rapid Writing.** (G.E.)
Assistant Professor WELLS and Mr. KURTZ.

For twelve weeks, the preparation of one single-page composition every day (except Saturday); discussion in class of points of form and style. The remainder of the half-year's work will consist of weekly themes of about six hundred words each.

2 hrs., first half-year. Tu Th, 1. Limited to twenty-five. Prerequisite: Courses 1 and 2. Applicants must obtain the consent of the instructor.

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6C. **Advanced Composition: Narrative and Descriptive.** (G.E.)
Assistant Professor WELLS.

Short sketches and stories. The lectures will be studies in narrative, based on representative novels and stories. Fortnightly compositions, with regular appointments for criticism.

2 hrs., second half-year. Tu Th, 1. Prerequisite: Courses 1 and 2. Limited to students who have the permission of the instructor.

7. **Speaking and Debating.**

7A. **Argumentation.** (G.E.) Assistant Professor FLAHERTY.

Preparation of briefs; presentation of arguments.

3 hrs., first half-year. Section I, debate Tu, 3-5; Section II, debate Th, 3-5; supervision of briefs by personal arrangement. Prerequisite: Courses 1 and 2 and the permission of the instructor. Some preliminary training in Vocal Expression, and in Economics or Political Science, is advisable.

7B. **Forensics.** (G.E.) Assistant Professor FLAHERTY.

Practice in debating. Arguments concerning moot-questions in politics and economics.

3 hrs., second half-year. W, 3-5; supervision of briefs, —. Open only to students selected from the class in Argumentation.

7C. **Oral Debates upon Literary Topics.** (G.E.)
Professor GAYLEY.

Training in the literary and stylistic features of argumentative discourse; the discussion of moot-questions concerning Shakespeare's plays and some of the more important masterpieces of recent literature.

2 hrs., first half-year. M, 4-6. Open to students who have taken 7A and 7B.

7D. **Public Speaking.** Mr. VON NEUMAYER.

An introductory course in masterpieces of oratory. Open to students who purpose specializing in the study of oratory.

2 hrs., first half-year. W F, 3. Prerequisite: Courses 3C and D, Junior standing, and a high grade in English courses.

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7E. **Public Speaking.** Mr. VON NEUMAYER.

Continuation of 7F. Declamations and extempore exercises based upon assigned topics in American history and politics.

2 hrs., second half-year. W F, 3. This course is open also to students in the College of Law.

7F. **The Reading of Selected Dramas.** Mr. VON NEUMAYER.

2 hrs., first half-year. To be arranged with the instructor. Prerequisite: Either 3C and 3D or 3E and 3F, or 7D or 7E.

8. **Literary Construction.**

8A. **Narrative Prose.** Assistant Professor HART.

2 hrs., either half-year, to be arranged. Two sections. An advanced course in composition. Limited to students of Junior and Senior standing who have the consent of the instructor.

*8B. **Verse and Prose.** Professor GAYLEY.

An advanced class, under individual criticism, in the writing of verse and prose for publication. Limited to ten Seniors and Graduates selected by the instructor from those who have published original work of some promise, or have gained distinction in Course 6 or 8A. Application should be made before the Christmas vacation.

2 hrs., second half-year. M W, 3.

PRINCIPLES OF LITERATURE; INTERPRETATION AND CRITICISM.

9A. **The Theory of Poetry.** (G.E.)

Professor GAYLEY and a Reader.

Lectures on poetry in its relation to the other arts. The history and technique of English verse. Reports on Aristotle's Poetics, and other masterpieces of literary theory; analysis of representative poems, ancient and modern. Fortnightly exercises in criticism.

3 hrs., second half-year. M W F, 2. Prerequisite: Courses 1 and 2. Open also to Graduates as part of Course 54.

*9B. **Problems in Literary Criticism.** (G.E.) Professor GAYLEY.

The characteristics and development of literary types (chosen from Lyric, Ballad, Idyl, Epic, Romance, and Novel). Seminar.

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2 hrs., first half-year, 1906-07. M, 4-6. Open only to students who have distinguished themselves in 7C or 9A, and to Graduates.

*9C. **The History of English Critical Prose.** (G.E.)
Professor GAYLEY.

Periods of development; special study of influences in theory and method, and of the pivotal masterpieces.

2 hrs., alternating with 9B. Open to students who have shown especial ability in Course 9A; also to Graduates.

9D. **Rhetorical Analysis.** (G.E.) Professor BRADLEY.

A graduate course especially adapted to the needs of teachers. It may, in exceptional cases, be taken by Seniors. See Course 52, below.

3 hrs., throughout the year. Tu, 2; Th, 1-3.

10A. **Interpretation: Logical and Literary.** (G.E.)
Professor LANGE.

Principles and methods; study of representative masterpieces; practical exercises, oral and written, with a view to training in composition. This course alternates with 10C.

3 hrs., first half-year. M W F, 10. Prerequisite: Courses 1 and 2.

10B. **Interpretation.** (G.E.) Professor LANGE.

Practical exercises based on Bacon's Essays. Introduction to research.

3 hrs., second half-year. M W F, 10. Open to students who have taken Course 10A; also to Graduates.

*10C. **Translation.** (G.E.) Professor LANGE.

Discussion of the factors and processes of interpretation involved; comparative study of representative specimens; practical exercises with a view to training in composition.

3 hrs., second half-year. M W F, 10. Prerequisite: Courses 1 and 2.

HISTORY OF LANGUAGE AND LITERATURE.

Students desiring to make a special study of the linguistic side of English Philology are advised to take, in addition to certain courses here announced,—such as 11A, 12A, 14A-14E, 30 and 31,—the course in Gothic offered by the German department, and courses announced

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under Linguistics. Course 11A will be accepted as sufficient preparation for courses in Gothic and Norse.

11A. **Old English.** (G.E.)
Professor LANGE and Assistant Professor NOYES.

Grammar; reading of selected prose and poetry.

3 hrs., first half-year. Two sections. Section I, M W F, 9. Section II, M W F, 10. Prerequisite: Courses 1 and 2.

*11B. **Old English Laws.** (G.E.) Professor LANGE.

Sources, characteristic features, and cultural aspects. Translation and collateral reading.

2 hrs., second half-year. Prerequisite: Course 11A.

*11C. **Norse Mythology.** Professor LANGE.

Lectures and topical study.

2 hrs., second half-year. M W, 11.

12A. **Beowulf.** (G.E.) Professor LANGE.

Lectures; interpretation; study of linguistic and literary topics with special reference to modern English.

3 hrs., second half-year. M W F, 9. Prerequisite: Course 11A.

*12B. **Old English Life.** (G.E.) Professor LANGE.

Investigation of special topics pertaining to the Germanic element in English life and culture.

2 hrs., first half-year. M W, 11. Prerequisite: Course 12A.

*14A. **Modern English Phonology.** (G.E. Professor LANGE.

A historical study of English pronunciation since 1500, with introductory lectures on the elements of phonetics.

3 hrs., second half-year. M W F, 8. Prerequisite: Course 11A.

14B. **History of the English Language.** (G.E.)
Professor LANGE.

The origin and growth of the English tongue, with special reference to phonology and accidence. This course alternates with 14A.

3 hrs., second half-year. M W F, 8. Prerequisite: Course 11A.

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*Not to be given in 1905-06.

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14C. **Introduction to English Grammar.** (G.E.)
Professor BRADLEY.

Lectures, with collateral study.

3 hrs., first half-year. Tu Th S, 8. A general acquaintance with at least two languages other than modern English is requisite.

*14D. **The Comparative Study of English Grammar.** (G.E.)
Professor BRADLEY.

Lectures, topical study, introduction to independent research.

3 hrs., second half-year. Tu Th S, 8. Open to Seniors and Graduates who have had 11A and 14C or their equivalents.

14E. **Studies in English Phonology.** (G.E.) Professor LANGE.

2 hrs., first half-year. M W, 11. Prerequisite: 14A, B or C.

13A. **Chaucer.** (G.E.) Assistant Professors NOYES and HART.

A minute study of selected tales and poems; the life and thought of his times.

3 hrs. Section I (Assistant Professor HART), first half-year. W F, 9; Section II (Assistant Professor NOYES), second half-year, M W F, 10. Prerequisite: Course 11A.

*13B. **Early English Metrical Romances.** (G.E.)
Assistant Professor HART.

A study of the typical romances. Lectures and theses. Prerequisite: 13A. Some knowledge of Old French is desirable.

2 hrs., second half-year. Tu Th, 9.

*13C. **English and Scottish Popular Ballads.** (G.E.)
Assistant Professor HART.

The ballad as a literary type; its relation to the epic and primitive poetry; theories of the beginnings of poetry. Lectures, reports and theses.

2 hrs., second half-year. Tu Th, 10.

15A. **Elizabethan Poetry.** (G.E.) Assistant Professor SANFORD.

Lectures on the development of lyric, pastoral, sonnet, madrigal, ode, elegy, and epithalamium (1550-1660) from their classical and renaissance sources. Readings and reports.

3 hrs., first half-year. Tu Th S, 8. Prreequisite: Courses 1 and 2.

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15B. **Spenser.** (G. E.) Assistant Professor SANFORD.

The development of the literary epic in Virgil, Dante, Ariosto, and Tasso, with special reference to Spenser's Faerie Queene.

3 hrs., second half-year. Tu Th S, 9. Prerequisite: The same as for 15A.

*17A. **The Predecessors and Contemporaries of Shakespeare.** (G.E.) Professor GAYLEY and a Reader.

Lectures, historical and critical; reading and analysis of representative plays; frequent written exercises by the class.

3 hrs., first half-year, 1906-07. M W F, 2. Prerequisite: Courses 1 and 2.

*17B. **Shakespeare.** (G.E.) Professor GAYLEY.

Shakespeare's relation to other Elizabethan dramatists; his personality and the development of his art. Historical and literary criticism of selected works.

2 hrs., second half-year, 1906-07. M, 4-6. Open to students who have shown distinct ability in Course 17A; also to Graduates.

17C. **Textual Studies in Shakespeare.** (G.E.) Assistant Professor HART.

A careful inquiry into the textual history and the language of three plays.

3 hrs., second half-year. M W F, 9. Prerequisite: Courses 1 and 2.

18A. **Milton.** Professor BRADLEY.

His Life and Times. Lectures, with reading of his English poems.

3 hrs., second half-year. Tu Th S, 8. Prerequisite: Courses 1 and 2.

*18B. **Milton.** (G.E.) Professor BRADLEY.

Study of special problems in connection with his poems.

3 hrs., first half-year. Tu Th S, 8. Prerequisite: Courses 1 and 2.

*19A. **The Age of Dryden.** (G.E.) Assistant Professor SANFORD.

3 hrs., first half-year. M W F, 2.

*19B. **The Age of Pope.** (G.E.) Assstant Professor SANFORD.

3 hrs., second half-year. M W F, 2.

To alternate with 15A and 15B beginning with 1906-07.

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21A. **History of Poetry in the Nineteenth Century.** (G.E.)
Professor GAYLEY and a Reader.

Lectures; readings and reports.

3 hrs., first half-year. M W F, 2. Fortnightly written exercises. Open, as free elective without prerequisite, to students who have at least Junior standing. Group Elective for students who have had Courses 1 and 2, and who fulfil additional requirements in term work and examination.

21B. **Poems of the Nineteenth Century.** (G.E.)
Professor GAYLEY.

Intensive study of selected masterpieces from Wordsworth, Fitzgerald, Tennyson, Arnold, Browning, or other poets.

2 hrs., second half-year. M, 4-6. Open to students who have distinguished themselves in 21A or 7C.

22A. **The History of American Literature.** (G.E.)
Assistant Professor ARMES.

A general view, illustrated by copious reading; lectures, reports, discussions, and papers.

3 hrs., first half-year. M W F, 10. Open, as Free Elective without prerequisite, to students who have at least Junior Standing. Group Elective for students who have had Courses 1 and 2, and who fulfil additional requirements in term work and examination.

22B. **American Authors.** (G.E.) Assistant Professor ARMES.

Intensive study of special authors. (In 1905-06: Hawthorne and Poe.)

3 hrs., second half-year. M W F, 10. Prerequisite: Courses 1 and 2.

23. **Representative Essayists.** Seminar.

In 1904-05, Courses 23A (Arnold) and 23B (Carlyle) were given. They will be repeated in 1906-07.

23C. **Emerson.** (G.E.) Professor BRADLEY.

3 hrs., first half-year. Tu Th S, 10. Open to Seniors and Graduates.

23D. **Ruskin.** (G.E.) Professor BRADLEY.

3 hrs., second half-year. Tu Th S, 10. Same conditions as 23C.

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*26. **Political and Philosophical Prose.** (G.E.)

Professor GAYLEY.

Advanced study of pivotal classics with reference to the thought, the arrangement, exposition, and style. This course will alternate with 21B.

2 hrs., first half-year. Open to students who have had 7A, 7B, or 9A.

COURSES IN OTHER DEPARTMENTS.

The Russian Novelists. Assistant Professor NOYES.

[See Slavic Languages 20.]

Slavic Literature. Assistant Professor NOYES.

[See Slavic Languages 21.]

These two courses will henceforth count toward guaduation only in the Department of Slavic Languages.

GRADUATE COURSES.

*30. **Old Norse.** Professor LANGE.

Outlines of the grammar; readings. The linguistic and literary relations of Old Norse to English.

2 hrs., throughout the year, to be arranged with the instructor. This course may, in exceptional cases, be taken by Seniors. Prerequisite: Course 11A, and, if possible, a knowledge of Gothic.

31. **Philological Seminar.** Professor LANGE.

2 hrs., throughout the year.

*35. **Seminar in Seventeenth Century Prose.**

Professor BRADLEY.

3 hrs., throughout the year.

*38. **The History of Naturalism in English Poetry.**

Professor SANFORD.

1 hr., throughout the year.

*39. **Seminar in English Literary History.** Professor GAYLEY.

In 1905-06, the careful investigation of problems in the development of English Comedy, or in the History of Criticism in England.

3 hrs., second half-year. W, 3-5. This course should be preceded by Course 9 or Courses 17A and 17B.

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THE COMPARATIVE HISTORY OF LITERATURE.

To the studies grouped under this heading the undergraduate Courses 9A, 9B, 11C, 13C, 15B, 17A, and 19 may be regarded as preliminary.

40. **The History of Aesthetic.** Professor GAYLEY.

From a study at first hand of the principal authorities.

3 hrs., first half-year. W, 3-5. This course should be preceded by Course 9A or 9B.

*41. **Seminar in the Comparative Study of Literature.** Professor GAYLEY.

History and methods of the study: the application of principles in the investigation of an author, a theme, a movement or a type.

3 hrs., second half-year. W, 3-5. Prerequisite: Courses 9 and either 39 or 40, and a sufficient knowledge of the classics and the modern languages.

*42. **Seminar in the Comparative Study of Literature.** Assistant Professor HART.

Investigation of special problems in the technique of the narra-

Investigation of special problems in the technique of the Ballad, Epic, Metrical Romance, etc.

2 hrs., either half-year, to be arranged with the instructor.

44. **The Revolt Against Classicism; The Romantic Renaissance: Seminar.** Assistant Professor SANFORD.

The romantic, naturalistic, and sentimental movement in England in the eighteenth and nineteenth centuries, with reference to the similar movement on the Continent.

2 hrs., throughout the year, to be determined after consultation. Prerequisite: A sufficient acquaintance with the French and German languages and literatures.

*45. **The Influence of Germany on English Literature of the Eighteenth and Nineteenth Centuries.** Professor LANGE.

(*a*) Goethe and Carlyle.

2 hrs., throughout the year.

50. **Special Study.**

The instructors in English hold themselves ready to assist and advise competent students who may propose plans of special study which meet the approval of the department.

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SPECIALLY FOR PROSPECTIVE SCHOOL TEACHERS.

51. **English in the Secondary Schools.**

Professor LANGE.

Lectures, discussions, prescribed reading, and illustrations of class exercises.

3 hrs., first half-year. M W F, 8.

52. **Seminar in Advanced Rhetorical Analysis.**

Professor BRADLEY.

3 hrs., throughout the year. Tu, 2; Th, 1-3.

*53. **The Teaching of Composition.** Assistant Professor WELLS.

Practice in the correcting of compositions. Organization of school courses in the subject.

2 hrs., first half-year, to be arranged with the instructor.

54. **The Principles of Literature.**

Professor GAYLEY.

In connection with Course 9. An additional course of reading in special topics, under individual direction.

3 hrs., first half-year. M W F, 2.

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*Not to be given in 1905-06.

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GERMAN.

HUGO K. SCHILLING, Ph. D., Professor of the German Language and Literature.

ALBIN PUTZKER, M.A., Professor of German Literature.

J. HENRY SENGER, Ph.D., Associate Professor of German.

MARTIN A. CENTNER, A.B., Instructor in German.

LUDWIG J. DEMETER, M.A., Instructor in German.

CLARENCE PASCHALL, M.A., Instructor in German.

WILLIAM H. MATLOCK, Ph.B., Assistant in German.

MICHAEL ONGERTH, Grad. Theol. (Univ. of Vienna), Assistant in German.

ANNA M. GOETZ, B.L., Reader in German.

The Group Elective. Prerequisites are Courses A (or admission subject 15b^2) and B (or admission subject 15b^3), or Course AB. Course 3 will be accepted in lieu of Course 2 upon the conditions stated below.

Students who wish to make a special study of German Literature are advised to acquire a reading knowledge of French and a general knowledge of the History of Philosophy. In the graduate courses some knowledge of Greek is highly desirable.

Teachers' Certificates. Students who desire the Teachers' Certificate should do not less than twenty units of Group Elective work in German, including German 6A, 6B, 7A, 12, 18A, 18B, and, after 1905-06, 6C. The recommendation for the certificate is not, however, given in course, but only for high scholarship and general proficiency in German, as judged by the department.

LOWER DIVISION COURSES.

PRIMARILY FOR FRESHMEN.

A. **Elementary German.**

Associate Professor SENGER, Mr. CENTNER, Mr. PASCHALL and Mr. MATLOCK.

The essentials of grammar; reading of modern prose; translation into German; reading at sight; conversation.

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3 hrs., throughout the year. M W F, 8, 9, 10, 1; Tu Th S, 8, 9. This course is intended as an equivalent for Matriculation Subject 15*b*[2].

AB. **Elementary German** (Double Course). Mr. DEMETER.

Grammar, including syntax; reading of modern prose and poetry and of one of Schiller's dramas; composition; reading at sight; conversation.

5 hrs., throughout the year. M Tu W Th F, 2.

This course combines the work of Courses A and B, and is intended for beginners who wish to prepare, in one year, for the advanced courses in German, or to acquire a reading knowledge of the language sufficient for use in other studies.

PRIMARILY FOR SOPHOMORES.

Prerequisite: Course A or credit in admission subject 15*b*[2].

B. **Modern Stories and Plays.**

Professor PUTZKER, Mr. CENTNER, and Mr. PASCHALL.

Selections from prose and poetry, including one of Schiller's dramas; grammar and composition; reading at sight; conversation. The course is conducted mainly in German. It is intended as an equivalent for Matriculation Subjects 15*b*[3] and 15*b*[4].

3 hrs., throughout the year. M W F, 8, 9, 1; Tu Th S, 8.

3. **German Prose.** Associate Professor SENGER.

Subjects in the Sciences, History and Economics. Journalistic German. Special reading assigned to students in connection with their courses. Constant practice in composition and reading at sight.

3 hrs., throughout the year. M W F, 10.

Course B is the regular Sophomore course leading up to the advanced courses in German. Course 3 provides special training in the reading of more or less technical texts. Students who have had Course 3 may, however, take Course 6A; and they may be admitted to Course 4, 5, or 8, if they take at the same time Course 6A or satisfy the department that they are not deficient in grammar and composition.

For students who have taken or are taking either of the intermediate courses, the other counts as four units only.

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UPPER DIVISION COURSES.

A. Primarily for Juniors.

Prerequisite: Course AB or B, or credit in admission Subject **15b**[3] (Intermediate German); or, conditionally, Course 3.

The courses in this group (except Course 9) are conducted in German.

4. Classics of the Eighteenth Century: Schiller. (G.E.)

Associate Professor Senger.

Schiller's principal dramas, and selections from his prose writings; Lessing's Minna von Barnhelm and Emilia Galotti; Goethe's Egmont or Iphigenie, and Hermann und Dorothea. Lectures on the life and times of Schiller, with collateral reading. Practice in composition.

3 hrs., throughout the year. M W F, 1.

5. Classics of the Eighteenth Century: Lessing. (G.E.)

Professor Putzker.

Lessing's principal dramas; Schiller's Wallenstein's Lager and Wallenstein's Tod; Goethe's Egmont or Iphigenie, and Hermann und Dorothea. Lectures on the life and times of Lessing, with collateral reading. Practice in composition.

3 hrs, throughout the year. M W F, 2.

8. Classics of the Eighteenth Century: Goethe. (G.E.)

Mr. Centner.

Goethe's principal dramas, and Hermann und Dorothea; Schiller's Wallenstein's Lager and Wallenstein's Tod; Lessing's Minna von Barnhelm and Emilia Galotti. Lectures on the life and times of Goethe, with collateral reading. Practice in composition.

3 hrs., throughout the year. M W F, 8.

For students who have taken or are taking one of the three Courses 4, 5, 8, either of the other two counts as four units only.

6A. Grammar, Composition, and Conversation. First Course. (G.E.)

Mr. Demeter.

2 hrs., throughout the year. Sec. I, Tu Th, 11; Sec. II, Tu Th, 1.

9. Outlines of the History of German Literature.

Professor Schilling.

Lectures and collateral reading of representative works (in English translations).

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1 hr., throughout the year. Tu, 4.

This course is open to students in all departments of the University, as a Free Elective, and does not require a knowledge of German. It is not intended for those who pursue the study of German beyond the courses primarily for Juniors; no student will receive credit for both German 9 and German 18.

B. PRIMARILY FOR SENIORS.

Prerequisite: Courses 4, 5, or 8; for Course 6B: Course 6A.

The courses in this group (except Course 21) are conducted in German.

18. **General History of German Literature.** (G.E.)
Professor SCHILLING.

First semester: the Middle Ages; second semester: from the Reformation to the Death of Goethe. Lectures and discussions; collateral reading; essays.

3 hrs., throughout the year. M W F, 2. With the permission of the instructor, either half may be taken separately.

7A. **Middle High German.** (G.E.) Mr. PASCHALL.

Outlines of grammar, with special reference to the development of Modern German. Selections from the Nibelungenlied, the Kudrun, and the epics of chivalry. Translation into Modern German.

3 hrs., first half-year. M W F, 9.

7B. **Classic Writers of the Middle Ages.** (G.E.)
Mr. DEMETER.

The poems of Walther von der Vogelweide; Hartmann's Iwein or Gottfried's Tristan.

3 hrs., second half-year. M W F, 9.

*12. **Outlines of the History of the German Language. Elementary Course.** Mr. PASCHALL.

3 hrs., second half-year. M W F, 9.

10. **Lyric Poetry in the Nineteenth Century.** (G.E.)
Professor PUTZKER.

The development of lyric poetry as an expression of the spirit of the times. Lectures and essays.

2 hrs., throughout the year. Tu Th, 9.

*Not to be given in 1905-06.

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*11. **German Novels of the Nineteenth Century.** (G.E.)
Professor PUTZKER.

2 hrs., throughout the year. Tu Th, 9.

6B. **Grammar, Composition, and Conversation. Second Course.** (G.E.)
Mr. DEMETER.

2 hrs., throughout the year. M W, 8.

21. **The Teaching of German.** Professor SCHILLING.

A course in methods, text-books, and teachers' aids, with practical demonstrations and visiting of schools. Collateral reading and reports.

1 hr., second half-year. Th, 3.

C. FOR SENIORS AND GRADUATES.

Prerequisite: Course 18, 7A, or 10; for Course 6C, Course 6B or its equivalent; for Course 13A, 3 years of German and either German 7A or English 11A (Old English).

6C. **Composition.** Third Course. (G.E.) Mr. DEMETER.

One conference a week with each student, at an hour to be appointed by the instructor.

*14A. **Schiller's Lyrics, Ballads, and Philosophical Poems.** (G.E.)
Professor SCHILLING.

A critical study of Schiller's style and methods; lectures, reading, and reports on assigned work.

2 hrs., first half-year. Tu Th, 2.

*14B. **Schiller's Dramas in the Light of his Aesthetical and Critical Writings.** (G.E.) Professor SCHILLING.

2 hrs., second half-year. Tu, Th, 2.

15A. **The Romantic School.** (G.E.)
Associate Professor SENGER.

I. The Schlegels, Novalis, Tieck, Schleiermacher, Fichte.

3 hrs., first half-year. M W, 11; Th, 1.

15B. **The Romantic School.** (G.E.) Associate Professor SENGER.

II. Brentano, Arnim, Fouqué, Eichendorff, Heine.

3 hrs., second half-year. M W, 11; Th, 1.

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*Omitted in 1905-06; to be given in 1906-07.

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*16A. **The German Drama in the Nineteenth Century.** (G.E.)
Associate Professor SENGER.

I. Kleist, Grillparzer, Immermann, Mosen, Halm.

3 hrs., first half-year. M W, 11; Th, 1.

*16B. **The German Drama in the Nineteenth Century.** (G.E.)
Associate Professor SENGER.

II. Hebbel, Ludwig, Geibel, Freytag, Heyse.

3 hrs., second half-year. M W, 11; Th. 1.

22. **The Faust Legend and Goethe's Faust.** (G.E.)
Professor SCHILLING.

3 hrs., first half-year. M F, 4; W, 11.

*23. **Goethe's Lyrics.** (G.E.)
Professor PUTZKER.

2 hrs., second half-year. Tu Th, 10.

13A. **Gothic: Grammar and Reading.**. (G.E.)
Professor SCHILLING.

2 hrs., first half-year. M W, 8.

GRADUATE COURSES.

13B. **Introduction to Germanic Philology.**
Professor SCHILLING.

(To be taken in connection with 13A.)

1 hr., first half-year. F, 8.

*19. **Old Saxon. Outlines of Germanic Metrics.**
Professor SCHILLING.

3 hrs., second half-year.

*17. **Old High German.** Professor SCHILLING.

3 hrs., first half-year.

28. **Historical Grammar of the German Language: Middle High German and Modern German.**
Professor SCHILLING.

3 hrs., second half-year.

24. **German Literature in the Sixteenth Century.**
Associate Professor SENGER.

1 hr., throughout the year.

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*Not to be given in 1905-06.

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25. **The Principles of Dramaturgy: Lessing's Hamburgische Dramaturgie and the Theories of the Present Day.**

Professor PUTZKER.

1 hr., throughout the year.

*29. **Herder and his Influence upon Goethe.**

Professor PUTZKER.

1 hr., throughout the year.

*26. **Germanic Antiquities.** Professor SCHILLING.

3 hrs., first half-year.

30. **Germanic Seminary.** Professor SCHILLING.

Special work for graduate students. S, 9.

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*Not to be given in 1905-06.

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ROMANIC LANGUAGES.

SAMUEL A. CHAMBERS, M.A., Assistant Professor of French.

CHARLES H. HOWARD, M.A., Instructor in French.

GUSTAVE FAUCHEUX, B. ès L., B. ès Sc., Instructor in French.

CARLOS BRANSBY, M.A., Litt.D., Instructor in Spanish.

ROBERT DUPOUEY, B. ès L., Agrégé ès Lettres de l'Université de Paris, Instructor in French.

EMMANUEL B. LAMARE, Assistant in French.

ALFRED SOLOMON, M.A., Assistant in French.

University Credit. Students who enter the University with credit in one or more of the Matriculation Subjects $15a^1$, $15a^2$ $15a^3$, $15a^4$, 15*c*, and who do satisfactory work in the corresponding subject, or subjects, in the University, will be given University credit, usually on the basis of three units of University work for one unit of preparatory work; but no University credit will be given for subjects required for matriculation.

Students from accredited schools who do not continue their work in this department, and those who enter with some knowledge of Romanic languages not acquired in an accredited school, will be obliged to take an examination in order to obtain University credit. Application for such examination should be made at the time of entrance to the University.

Credit for the advanced courses will be given only upon the basis of work regularly and satisfactorily performed in some university of good standing.

The Group Elective. Any of the Upper Division Courses may be offered for the Group Elective, but no others.

Teachers' Certificate. Applicants for this certificate will be required to take, in addition to the Lower Division Courses, at least six hours of Junior and twelve hours of Senior work, but the formal compliance with this requirement does not necessarily entitle the applicant to the certificate; and in any case a fair speaking knowledge will be a requisite.

General Statement. The Romanic Languages will be taught as living languages, the aim of the instruction being to enable the

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student to speak and write them with fluency, as well as to gain a knowledge of the several literatures and the main problems connected with their development.

Notice to Other Departments. The members of this department stand ready to give help to advanced students who may wish to make researches in Philosophy, History, Science, etc., by means of books written in a Romanic language. They will divide the work among themselves and will hold office hours for this purpose.

FRENCH.

LOWER DIVISION COURSES.

A. PRIMARILY FOR FRESHMEN.

During the first year there will be a careful study of grammatical forms and the essentials of syntax. Stress will be laid throughout upon the acquisition of an exact pronunciation. From the very beginning an effort will be made to lead the student to understand the spoken language and to express himself in it orally and in writing.

A. **First-Year French.** Mr. HOWARD, Mr. LAMARE, Mr. SOLOMON, and Mr. ———.

Grammar; easy short stories and plays by modern authors.

3 hrs., throughout the year. Eight sections. Section I, M W F, 9; Section II, M W F, 10; Section III, M W F, 1; Section IV, M W F, 2; Section V, M W F, 3; Section VI, Tu Th S, 8; Section VII, Tu Th S, 9; Section VIII, Tu Th S, 10.

This Course is intended as an equivalent for Matriculation Subject 15a^2.

B. PRIMARILY FOR SOPHOMORES.

During the second year the texts read will be explained in the language studied. There will be abundant practice in speaking and writing, based chiefly upon the text. These courses will include also a further study of syntax. One-third of the time will be given to the writing of French.

B. **Second-Year French.**

Assistant Professor CHAMBERS, Mr. HOWARD, Mr. FAUCHEUX, Mr. DUPOUEY, Mr. LAMARE, and Mr. SOLOMON.

Advanced grammar; contemporary French prose. Some comedy. Supplementary reading outside of the class.

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3 hrs., throughout the year. Section I, Tu Th S, 11; Section II, M W F, 9; Section III, M W F, 8; Section IV, M W F, 10; Section V, M W F, 3; Section VI, M W F, 1.

This course is intended as an equivalent for Matriculation Subjects 15a^3 and 15a^4.

UPPER DIVISION COURSES.

A. Primarily for Juniors.

These courses will be given in the language studied. Grammatical and literary exercises on the texts read. Written reports and themes. The reading will be so systematized as to give the student a fair knowledge of a literature or of some literary period.

4A. **Modern French.**

Assistant Professor Chambers, Mr. Faucheux, Mr. Dupouey.

Representative writers of the Romantic School.

3 hrs., first half-year. Three Sections. Section I, M W F, 9; Section II, M W F, 2. Section III, M W F, 10.

4B. **Modern French.**

Assistant Professor Chambers, Mr. Faucheux, Mr. Dupouey.

Representative writers of the Realistic School.

3 hrs., second half-year. Three Sections. Section I, M W F, 9; Section II, M W F, 2. Section III, M W F, 10.

6A. **Classic French.** Mr. Dupouey.

Representative writers of the seventeenth century.

3 hrs., first half-year. M W F, 2.

6B. **Classic French.** Mr. Dupouey.

Representative writers of the seventeenth and eighteenth centuries.

3 hrs., second half-year. M W F, 2.

B. Primarily for Seniors.

The courses in this group will be given in the language studied. In the literary courses there will be as complete a study as possible of a type, of a movement, or of a period. The work of the class will take the form of reading, reports, themes, and discussion, with occasional lectures by the instructor.

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3. The Teaching of French. Assistant Professor CHAMBERS.

A study of the methods, text-books and materials that are used in elementary instruction. Lectures, readings, reports. Required of all applicants for Teacher's Certificate in French and Spanish.

1 hr., second half-year.

7A. History of French Literature.

Assistant Professor CHAMBERS.

Courses 7A and 7B will be a study of the Great Writers and Great Books of French literature; the minor writers and the literary movements will be dealt with in lectures by the instructor. A short manual will be used as a basis. Course *7a* will cover the literature as far as the eighteenth century.

3 hrs., first half-year. M W F, 10.

7B. History of French Literature.

Assistant Professor CHAMBERS.

The Great Writers and Great Books of the eighteenth and nineteenth centuries.

3 hrs., second half-year. M W F, 10.

***8. Modern Drama.** Mr. DUPOUEY.

A study of the drama from Diderot to the present time.

2 hrs., throughout the year. Tu Th, 10.

18. French Lyric Poetry. Assistant Professor CHAMBERS.

This course will be devoted to the three schools of the nineteenth century: Hugo and the Romantics; Gautier and the Parnassians; Verlaine and the Symbolists.

2 hrs., throughout the year. Tu Th, 11.

***19. The French Novel.** Mr. DUPOUEY.

An account of the changes in taste in the matter of fiction from the beginning of the literature to the time of Rousseau. Then a study of the novel and short story from the seventeenth to the nineteenth century, based on the texts themselves.

2 hrs., throughout the year. Tu Th, 1.

19B. The Modern Novel. Mr. DUPOUEY.

A study of French fiction from Balzac to the present time.

2 hrs., throughout the year. Tu Th, 1.

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*Not to be given in 1905-06.

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20. **French Comedy.** Mr. FAUCHEUX.

Mediaeval Comedy; Comedy in the sixteenth century. Precursors of Molière; successors of Molière; Marivaux; Nivelle de la Chaussée; Diderot and his dramatic theories; Beaumarchais.

2 hrs., throughout the year. Tu Th, 10.

*21. **French Tragedy.** Mr. FAUCHEUX.

Mediaeval drama; tragedy in the sixteenth century: tragicomedy; Hardy; classic tragedy; Corneille; Racine; decline of classic tragedy; Crébillon; Voltaire.

2 hrs., throughout the year. Tu Th, 11.

23. **Problems in Comparative Literature.** Mr. DUPOUEY.

Several problems will be taken up during the year in order to illustrate methods of research in this subject. The following are typical problems: The Influence of Robinson Crusoé on French Literature; The Mutual Influence of Tolstoi and his French Contemporaries.

2 hrs., throughout the year. Tu Th, 2.

24. **French Lectures.** The Department.

One or more series of lectures in French or English on some topic connected with French literature or French institutions. Collateral reading and weekly reports by the student. Each series will be announced. Open to the public.

2 hrs., throughout the year. Tu Th, 4.

25. **Old French.** Mr. FAUCHEUX.

The object of this course is the reading of Old French literature; consequently, more attention will be paid to morphology and syntax than to phonetics. Reading: Chanson de Roland; Chrétien de Troyes; Chevalier au Lion. For Graduates and Seniors.

3 hrs., throughout the year. M W F, 3.

29. **Special Study.**

The instructors in Romanic Languages hold themselves ready to advise and assist students who may propose plans of special study.

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*Not to be given in 1905-06.

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SPANISH.

(See introduction to the corresponding division in French.)

LOWER DIVISION COURSES.

A. First-Year Spanish.

Mr. HOWARD, Dr. BRANSBY, and Mr. ———.

Elements of Spanish grammar. Easy short stories and plays.

3 hrs., throughout the year. Four sections. Section I, Tu Th S, 9 (Mr. Howard); Section II, M W F, 9; Section III, M W F, 3 (Dr. BRANSBY); Section IV, M W F, 2.

This course is intended as an equivalent for Matriculation Subject 15*c*.

2. Second-Year Spanish. Dr. BRANSBY.

Advanced grammar. Modern Spanish novels and plays.

3 hrs., throughout the year. Two sections. Section I, M W F, 8; Section II, M W F, 2.

UPPER DIVISION COURSES.

4A. Modern Spanish. Mr. ———.

Reading of the novel, drama, and poetry, with an account of the literature of the first half of the nineteenth century; of poets, probably Becquer or Espronceda will be read.

3 hrs., first half-year. M W F, 9.

4B. Modern Spanish. Mr. ———.

Novel, drama, and poetry from 1850 to the present time. One poet, Campoamor or Nuñez de Arce, will be read.

3 hrs., second half-year. M W F, 9.

6A. Classic Prose and Verse. Dr. BRANSBY.

Cervantes and his contemporaries.

3 hrs., first half-year. M W F, 10.

6B. Classic Drama. Dr. BRANSBY.

Calderon, Lope de Vega, Tirso de Molina.

3 hrs., second half-year. M W F, 10.

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9A. **Old Spanish.** Mr. HOWARD.

An account of the origins of the Spanish language and literature. The Poema del Cid will be read. Not given for less than ten students.

3 hrs., first half-year. Tu Th S, 8.

9B. **Early Spanish.** Mr. HOWARD.

A comprehensive account of the Spanish literature previous to the classic period. Important works will be read, especially the Romancero. Not given for less than ten students.

3 hrs., second half-year. Tu Th S, 8.

3. **The Teaching of Spanish.** Assistant Professor CHAMBERS.

To be taken with French 3. Required of all applicants for the Teacher's Certificate in Spanish.

1 hr., second half-year.

ITALIAN.

(See introduction to the corresponding division in French.)

LOWER DIVISION COURSES.

1. **First-Year Italian.** Mr. ———.

Essentials of Grammar. Short stories by contemporary writers.

3 hrs., throughout the year. M W F, 10.

2. **Second-Year Italian.** Mr. ———.

A careful review of Italian syntax. Reading of modern authors.

3 hrs., throughout the year. M W F, 2.

UPPER DIVISION COURSES.

4A. **Modern Italian.** Mr. ———.

The Romantic writers, with an account of the literature of the period: Manzoni, Leopardi.

3 hrs., first half-year. M W F, 9.

4B. **Modern Italian.** Mr. ———.

The writers of the last half of the nineteenth century.

3 hrs., second half-year. M W F, 9.

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*6A. **Petrarch, Boccacio, and Dante.** Mr. ———.

Dante's minor works.

3 hrs., first half-year. M W F, 9.

*6B. **Dante.** Mr. ———.

The Divina Commedia.

3 hrs., second half-year. M W F, 9.

GRADUATE COURSES.

27. **Seminary in Old French.** Mr. FAUCHEUX.

The members of the seminary may devote their time to the study of a common question or text, or may choose individual topics and make periodical reports on them.

2 hrs., throughout the year. Tu Th, 9.

28. **Seminary in French Literature.**

Assistant Professor CHAMBERS.

This seminary is formed for the guidance of those who wish to study special topics in French literature. Reports of these studies are to be made from time to time to the seminary. A general topic, however, may be chosen and the year be devoted to this. Open to qualified Seniors.

2 hrs., throughout the year. Tu Th, 9.

In graduate courses the number of hours indicate the minimum of units.

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*Not to be given in 1905-06.

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SLAVIC LANGUAGES.

GEORGE R. NOYES, Ph.D., Assistant Professor of English and Slavic Philology.

LOWER DIVISION COURSES.

RUSSIAN.

1. **Elementary Russian.** Assistant Professor NOYES.

Motti's Russian Grammar. Reading of Russian prose selections. Practice in conversation.

3 hrs., throughout the year. M W F, 1. By special arrangement with the instructor, this course may be counted as work of the Upper Division, for the Group Elective in Slavic Languages.

UPPER DIVISION COURSES.

RUSSIAN.

2. **Second-Year Russian.** (G.E.) Assistant Professor NOYES.

Reading of Russian prose authors. Composition. Practice in conversation.

3hrs., throughout the year. M W F, 2.

POLISH.

6. **Elementary Polish.** (G.E.) Assistant Professor NOYES.

Wicherkiewicz's Polnische Grammatik. Reading of Sienkiewicz and Mickiewicz.

3 hrs., throughout the year. Prerequisite: Russian 1 or its equivalent.

SLAVIC LITERATURE.

The following courses do not require a knowledge of any Slavic language, and are open to all students of the Upper Division. But, by special arrangement with the instructor, they may be counted for the Group Elective in Slavic Languages.

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20. **The Russian Novelists.** Assistant Professor NOYES.

Lectures and reading. Authors: specially Tolstoi; also Gogol, Turgenev, Dostoevski, Gorki, and others.

3 hrs., first half-year. M W F, 8.

21. **Slavic Literature.** Assistant Professor NOYES.

Lectures and reading. An outline history of Russian literature, exclusive of the novelists. Some attention will be given to important authors in other Slavic literatures, such as Comenius and Sienkiewicz, and to Slavic folk-lore.

3 hrs., second half-year. M W F, 8.

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MATHEMATICS.

IRVING STRINGHAM, Ph.D., Professor of Mathematics.

GEORGE C. EDWARDS, Ph.B., Associate Professor of Mathematics.

MELLEN W. HASKELL, Ph.D., Associate Professor of Mathematics.

ERNEST J. WILCZYNSKI, Ph. D., Assistant Professor of Mathematics.

CHARLES A. NOBLE, Ph.D., Assistant Professor of Mathematics.

ALBERT W. WHITNEY, A.B., Assistant Professor of Mathematics.

DERRICK N. LEHMER, Ph.D., Assistant Professor of Mathematics.

THOMAS M. PUTNAM, Ph.D., Instructor in Mathematics.

JOHN H. MCDONALD, Ph.D., Instructor in Mathematics.

BURT L. NEWKIRK, Ph.D., Instructor in Mathematics, Watson Assistant in Astronomy.

ALFRED J. CHAMPREUX, B.S., Assistant in Mathematics.

Students in the College of Letters, or of Social Sciences, or of Natural Sciences, must include the subject of Analytic Geometry as an essential part of their programme of mathematical studies. They may satisfy this prescription by electing Course 1 in their Freshman year; but Course 1 should not be chosen as a preparation for more advanced courses, and students who desire to continue their mathematical studies beyond the first year should elect Courses C and 5, instead of Course 1. Course B is strongly recommended as an additional elective to all students who have not already studied solid geometry.

Course 2A is prescribed to Freshmen, and Course 2B to Sophomores in the College of Commerce; Course 3A to Freshmen and Course 3B to Sophomores in the Colleges of Engineering; Course 4A to Freshmen and Course 4B to Sophomores in the College of Chemistry; Course 19A to Juniors in the College of Mechanics.

Students in the College of Agriculture may elect any combination of at least six units which includes analytic geometry.

Students wishing to make a specialty of Mathematics should elect Courses C and 5 in the Freshman year, and should consult the members of the department as early as possible.

The Upper Division. Courses C, 5, 8, and 9A are prerequisite to work in the Upper Division.

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Teachers' Certificates. The department will, in general, recommend as qualified to teach mathematics in high schools only such graduates as have passed with credit in at least eighteen units of Upper Division work, including Course 18. The department reserve the right to exact a practical test of the candidate's ability to present a clear and interesting exposition of subjects taught in the high school.

LOWER DIVISION COURSES.

A. **Elementary Algebraic Theory.**

Assistant Professors NOBLE and LEHMER.

Mathematical Induction, the remainder and factor theorems, the binomial theorem for positive integral exponents, theory of indices, theory of quadratic equations, simultaneous quadratic equations, the progressions, and other simple series.

2 hrs., either half-year. Tu, Th, 9. Course A is equivalent to admission requirement 4*a*, and is prerequisite to Course 8.

B. **Solid and Spherical Geometry.**

Associate Professor EDWARDS and Dr. MCDONALD.

The fundamental propositions of the Euclidean geometry of space.

2 hrs., either half-year. Tu Th, 9, 10. Course B is equivalent to admission requirement 4*b*.

C. **Plane and Spherical Trigonometry.**

Assistant Professor WILCZYNSKI, Dr. PUTNAM, Dr. NEWKIRK.

The development of the general formulae of trigonometry. Practice in the use of logarithmic tables. Applications of trigonometry to the solution of triangles and to mensuration in general.

3 hrs., either half-year. M W F, 10; Tu Th S, 9, 10.

1. **Elements of Analysis.** Associate Professor HASKELL, and Assistant Professor WILCZYNSKI.

The methods of higher algebra, plane trigonometry, analytic geometry, and the differential and integral calculus, with some account of their historical development.

3 hrs., throughout the year. M W F, 10, 3. Prescribed (alternatively with Courses C and 5) to Freshmen in the Colleges of Letters, Social Sciences, and Natural Sciences.

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2. **Elements of Analysis.**

Assistant Professor WHITNEY.

Plane trigonometry, advanced algebra, analytic geometry, and elements of the differential and integral calculus, with applications to problems in Economics.

2A. 3 hrs., throughout the year. M W F, 10. Prescribed to Freshmen in the College of Commerce.

2B. 2 hrs., throughout the year. Tu Th, 10. Prescribed to Sophomores in the College of Commerce.

ELEMENTS OF ANALYSIS, WITH APPLICATIONS.

A practical course in spherical trigonometry, algebra, analytic geometry, the differential and integral calculus, adapted particularly to the needs of students in Engineering and Chemistry.

3A. **First Course.** Associate Professor EDWARDS.
Assistant Professors NOBLE, WHITNEY, and LEHMER,
Dr. PUTNAM, Dr. MCDONALD, and Dr. NEWKIRK.

3 hrs., throughout the year, beginning either half-year. M W F, 9, 10. Prescribed, Freshman year, in the Colleges of Engineering.

3B. **Second Course.** Associate Professor EDWARDS,
Assistant Professors NOBLE and LEHMER,
Dr. PUTNAM, Dr. MCDONALD, and Dr. NEWKIRK.

5 hrs., throughout the year, beginning either half-year. M Tu W Th F, 8. Prescribed, Sophomore year, in the Colleges of Engineering.

4A. **First Course.** Mr. CHAMPREUX.

5 hrs., throughout the year. M Tu W Th F, 8. Prescribed, Freshman year, in the College of Chemistry.

4B. **Second Course.** Mr. CHAMPREUX.

3 hrs., throughout the year. M W F, 9. Prescribed, Sophomore year, in the College of Chemistry.

5. **Plane Analytic Geometry.** Professor STRINGHAM,
Associate Professor HASKELL, Assistant Professor WILCZYNSKI,
Dr. PUTNAM and Dr. NEWKIRK.

The analytic geometry of the straight line, the circle, and the conic sections, including a discussion of the general equation of the second degree and some special examples of higher loci.

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3 hrs., either half-year. First half-year, M W F, 9, 3; second half-year, M W F, 10; Tu Th S, 9, 10. Prerequisite: Course C or admission requirement $12a^2$.

8. **Algebra.** Professor STRINGHAM, Assistant Professors WILCZYNSKI, NOBLE, and LEHMER.

Inequalities and limits, exponentials and logarithms, permutations and combinations, binomial theorem for any index, expansion of functions in series, convergency of series.

3 hrs., either half-year. First half-year, M W F, 9; Tu Th S, 9. Second half-year, M W F, 3; Tu Th S, 9. Prerequisite: Course A or admission requirement 4*a*.

9A. **Differential Calculus.** Assistant Professor WILCZYNSKI.

The fundamental principles and formulae of the differential calculus, with applications to various problems of geometry and analysis, such as indeterminate forms, maxima and minima, expansion of functions in series, etc.

3 hrs., second half-year. M W F, 9. Prerequisite: Courses 5 and 8. Students wishing to begin the calculus in the first half-year may elect Course 4B.

UPPER DIVISION COURSES.

These courses are open to students in the Lower Division who have the necessary prerequisites.

*9B. **Integral Calculus.** Mr. ———.

The fundamental principles and formulae of the integral calculus, with applications to geometry, such as lengths of curves, areas and volumes, centers of position, etc.

3 hrs., first half-year. M W F, 9. Prerequisite: Course 9A.

11A. **Determinants and Theory of Numerical Equations.** Assistant Professor LEHMER.

The theory of determinants, with applications to geometry and algebra. Transformation of equations, solution of numerical equations, elimination, symmetric functions, continued fractions.

3 hrs., first half-year. Tu Th S, 10. Prerequisite: Course 8.

*Not to be given in 1905-06.

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11B. Algebraic Theory of Equations.

Assistant Professor LEHMER.

The theory of equations, from the point of view of the theory of substitutions and of the theory of invariants.

3 hrs., second half-year. Tu Th S, 10. Prerequisite: Course 11A.

12A. Advanced Analytic Geometry.

Associate Professor HASKELL.

General properties of conic sections; introduction to the theory of higher plane curves.

3 hrs., first half-year. M W F, 10. Prerequisite: Course 5.

12B. Analytic Geometry of Three Dimensions.

Associate Professor HASKELL.

The elementary analytic geometry of the straight line in space, the plane, the sphere, and the conicoids, and a discussion of the theory of higher curves and surfaces, including the determination of curvature, by the methods of the differential calculus.

3 hrs., second half-year. M W F, 10. Open only to students who have taken, or are taking, Course 9A.

13. Synthetic Projective Geometry. Dr. PUTNAM.

3 hrs., second half-year. M W F, 9.

14. Higher Plane Curves. Associate Professor HASKELL.

Introduction to the theory of higher plane curves, with special reference to the problem of curve-tracing in Cartesian and in homogeneous coördinates.

3hrs., second half-year. M W F, 9. Prerequisite: Course 9A.

16. Quaternions. Professor STRINGHAM.

An elementary presentation of the principles of the subject, with illustrations of its application to geometry and to mechanics.

3 hrs., throughout the year. M W F, 2.

17. Calculus of Finite Differences.

Assistant Professor WHITNEY.

2 hrs., second half-year. Tu Th, 11. Prerequisite: Course 9B.

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18. **Logic of Mathematics.** Professor STRINGHAM.

Analysis of the foundation principles of geometry and algebra. The number-system and the vector-system of algebra compared. The geometrical theory of proportion, and the irrational. The non-Euclidean geometry. Outlines of the history of mathematical discovery, and of the development of mathematical thought, with special reference to its significance as a factor in intellectual progress.

3 hrs., throughout the year. M W F, 1. Designed especially for teachers and prospective teachers of mathematics. Prerequisite: A course in formal logic.

19A. **Differential Equations.** Associate Professor EDWARDS.

Theory and methods of solution of ordinary differential equations, followed by a short introduction to partial differential equations.

3 hrs., first half-year. M W F, 10. Prescribed, Junior year, in the College of Mechanics.

19B. **Differential Equations.** Associate Professor EDWARDS.

3 hrs., second half-year. M W F, 10. Elective to students who have completed Course 19A.

20A. **Theory of Probabilities; Elementary Course.**
Assistant Professor WHITNEY.

2 hrs., first half-year. Tu Th, 9. This course is prerequisite to Courses 10 and 11 in Economics.

*20B. **Theory of Probabilities; Advanced Course.**
Assistant Professor WHITNEY.

Curves of error, correlation surfaces, applications to statistical problems in Economics and Biology.

3 hrs., second half-year. M W Th, 3. Prerequisite: Course 20A and a thorough course in Calculus.

*23. **Partial Differential Equations.** Dr. PUTNAM.

Theory of definite integrals, Fourier's Theorem and applications, introduction to harmonic functions.

3 hrs., first half-year.

24. **Theory of Functions of a Complex Variable.** Dr. NEWKIRK.

(Introductory course). Lectures on the general theory of functions.

3 hrs., first half-year. M W F, 3.

*Not to be given in 1905-06.

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31. **Theory of Numbers.** Dr. PUTNAM.

Properties of whole numbers, both ordinary and complex, theory of congruences, residues of powers, primitive roots, quadratic forms.

3 hrs., first half-year. M W F, 9.

GRADUATE COURSES.

*15. **Analytic Projective Geometry.**

Associate Professor HASKELL.

The fundamental principles of projective geometry treated analytically. The principle of duality, double-ratios, involution, linear transformations of one, two, and three dimensional figures, particularly of loci of the second order and class.

3 hrs., throughout the year. M W F, 10. Prerequisite: Courses 12A and 13.

21. **Theory of Functions of Real Variables.** Dr. McDONALD.

Simple and multiple intergrals; line, surface, and space integrals; Laplace's Equation and its applications; series; geometrical applications.

3 hrs., first half-year.

*22. **Transformation Groups and Differential Equations.**

An introduction to Lie's Theory; applications to the theory of functions, to the theory of invariants of linear differential equations, and to hydrodynamics.

2 hrs., throughout the year.

25. **Projective Differential Geometry.**

Assistant Professor WILCZYNSKI.

3 hrs., throughout the year. M W F, 10.

*26. **Absolute Geometry.** Professor STRINGHAM.

An analytical treatment of the absolute geometry of space.

3 hrs., throughout the year. M W F, 2.

*27. **Elliptic and Other Special Functions.** Dr. McDONALD.

A study of the principal functions of modern analysis, with reference to their practical application.

3 hrs., throughout the year. M W F, 3. Prerequisite: Course 24.

*Not to be given in 1905-06.

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***28. Abelian Functions.** Associate Professor HASKELL.

An advanced course in the theory of functions of a complex variable, with applications to the theory of higher plane curves.

3 hrs., throughout the year. Prerequisite: Course 24.

30. Algebraic Forms and Geometric Transformations.
Associate Professor HASKELL.

Theory of linear transformation, invariants and covariants of binary and ternary quantics. Applications to the theory of equations, and to higher plane curves. Quadratic transformations and the general theory of correspondence.

3 hrs., throughout the year. M W F, 2.

***32. Theory of Finite Groups.** Dr. PUTNAM.

Substitution groups with applications to the resolution of algebraic equations; the rotation groups; introduction to the theory of abstract groups.

3 hrs., second half-year. Tu Th, 8; Tu, 1.

33. Theory of Differential Equations. Assistant Professor NOBLE.

3 hrs., second half-year.

38. Calculus of Variations. Assistant Professor NOBLE.

3 hrs., first half-year. M Tu Th, 11.

40. Mathematical Seminary. Professor STRINGHAM.

Conferences between members of the mathematical department and students engaged in higher mathematical work, for the discussion of questions related to their studies, and for the examination of recent mathematical literature; under the direction of Professor STRINGHAM. Meetings once a week. Tu, 2-4. Credit value to be determined in each case.

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*Not to be given in 1905-06.

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PHYSICS.

FREDERICK SLATE, B.S., Professor of Physics.

E. PERCIVAL LEWIS, Ph.D., Associate Professor of Physics.

WILLIAM J. RAYMOND, B.S., Assistant Professor of Physics.

ELMER E. HALL, Ph.D., Instructor in Physics.

RALPH S. MINOR, Ph.D., Instructor in Physics.

BRUCE V. HILL, Ph.D., Instructor in Physics.

THOMAS C. MCKAY, Ph.D., Instructor in Physics.

LOUIS A. PARSONS, Ph.D., Instructor in Physics.

WILLIAM R. STAMPER, Mechanician in the Department of Physics.

(And nine Assistants in Lecture-room and Laboratories.)

Courses 1 to 3 are fundamental and designed to meet the needs of students preparing for applications of Physics, or advanced work in the subject itself. Course 4 is especially designed for students in the Colleges of Letters and Social Sciences. By special arrangement with the Professor of Physics, Course 4 may be substituted for Course 2A as a prerequisite for other work in Physics, or for work in other departments; or Courses 4 and 18 together may replace Courses 1 and 2A, in order to shorten the preparation for advanced work. Courses 2A and 4 are alternatives; credit toward graduation will not be allowed for both of them. Students who have completed Course 1 will profit greatly if they supplement the course of laboratory work regularly laid out. For credit on special and supplementary laboratory work see Course 18. The Physical Laboratory will be open five days a week throughout the year, and may be used, under the guidance of the instructors concerned, by advanced students.

Laboratory deposits are at the rate of five dollars a half-year for each laboratory exercise a week. The average amount returned to the student at the end of the half-year, after deducting for cost of materials used and for breakage of apparatus, is about one-half of the deposit.

Students who choose Upper Division Courses in Physics must include an adequate amount of laboratory exercises in the work chosen; the instructors should be consulted on this point. Such students are strongly advised to take Course 5A in the Junior year.

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Teachers' Certificates. Twenty-four units of Physics will be required for the teacher's recommendation. Applicants for the recommendation in Physics, in making up this number of units, must include in their work the equivalent of Courses 1 and 3, with either Course 4 or Course 2A. See statements under these headings, and under Course 18. *(In all cases proposed combinations of courses should be submitted for approval to the Professor of Physics.)*

LOWER DIVISION COURSES.

1. **General Physics.** Dr. HILL, Dr. PARSONS and Mr. ———.

Properties of matter, mechanics, and heat. Laboratory exercises twice a week, preceded by a lecture or a recitation.

6 hrs., throughout the year; 3 units each half-year. Section I, Tu Th, 9-11; II, W, 1-4, and S, 9-12; III, M F, 1-4; IV, Tu Th, 1-4. Open to students who have passed the entrance examination in Physics. Prescribed, Freshman year, in the Colleges of Agriculture, Engineering, and Chemistry.

2A. **General Physics.**

Associate Professor LEWIS and Dr. E. E. HALL.

Lectures with experimental illustration, recitations, and problems. Sound, light, electricity, and magnetism, presented as a continuation of Course 1.

3 hrs., throughout the year. Section I, Tu Th S, 11; Associate Professor LEWIS; Section II, M W F, 10, Dr. HALL. Open to students who have passed an examination covering the ground of Course 1. Prescribed, Sophomore year, in the Colleges of Agriculture and Chemistry (Section I); and Engineering (Section II). But for the first half-year only in the College of Civil Engineering.

3. **Physical Measurement.** Dr. MINOR and Dr. MCKAY.

Experimental work in sound, light, electricity, and magnetism, requiring quantitative results. Methods are selected so as to show instructive relations of physical principles, and their adaptation to practical problems. The course is varied by means of alternative experiments, to suit the needs of students in the different colleges. Laboratory exercises twice a week.

6 hrs., throughout the year; 2 units each half-year. Section I, M F, 1-4; II, Tu Th, 9-12; III, Tu Th, 1-4; IV, W, 1-4; S, 8-11. Prescribed, Sophomore year, in the Colleges of Engineering and Chemistry; but for the first half-year only in the College of Civil Engineering.

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*4. **General Physics.** Professor SLATE.

Lectures with experimental illustration and recitations on topics in heat, light, sound and electricity; giving prominence to subjects which are of importance as connected with the growth and the present condition of the science.

3 hrs., throughout the year. Tu Th, 11, and S, 9. Prerequisite: At least full Sophomore standing. The attention paid to methods of presentation makes this a profitable course for prospective teachers of elementary physics.

UPPER DIVISION COURSES.

5. **Analytic Mechanics.** (G.E.)

Professor SLATE, Assistant Professor RAYMOND and Dr. HALL.

The mathematical treatment of the important principles of dynamics and statics, fully illustrated by problems and applications.

5 hrs., first half-year. M Tu W Th F, 8. 3 hrs., second half-year. M W F, 8. Three sections. Prerequisite: Course 9 or 3B in Mathematics. Prescribed, Junior year, in the Colleges of Engineering.

NOTE.—As an elective, the first half-year of Course 5 may be taken alone. It should be registered as Course 5A.

6. **Harmonic Motion.** (G.E.) Assistant Professor RAYMOND.

The analytical treatment of wave-motion, with application to sound, light, and electricity. Lectures.

2 hrs., second half-year. Tu Th, 10. Prerequisite: Course 5A, and Course 2A or 4.

7. **Absolute Electrical Measurements.** (G.E.)

Assistant Professor RAYMOND.

One lecture and two laboratory exercises a week.

7 hrs., second half-year; 3 units. Lecture, W, 10. Laboratory, Tu Th, 1-4. Prerequisite: Course 5A, and Courses 1, 2A, 3, and 10. Elective, Junior year, in the College of Mechanics.

8. **Theory of Light.** (G.E.) Dr. E. E. HALL.

Lectures, with experimental illustrations, on selected topics in light, relating to the theory of optical instruments, and treated by the methods of geometrical optics and the wave-theory.

*Not to be given in 1905-06.

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3 hrs., first half-year. Tu Th, 11. Prerequisite: Course 2A or 4 in Physics; Course 9 or 3B in Mathematics. Students are strongly recommended to accompany this course with special laboratory work under Course 18.

8A. **Polarized Light.** (G.E.) Dr. MINOR.

Lectures with experimental illustration. Methods of producing and detecting plane, circularly, and elliptically polarized light. Practical applications in crystallography, saccharimetry, and metallic reflection. Optical activity.

2 hrs., second half-year. Prerequisite: Courses 1, 2A, and 3, or their equivalent. Laboratory work (1 unit required) will be offered under Course 18.

9A. **Molecular Physics.** Mr. ———.

A descriptive study of the gaseous, liquid and solid states of matter. Supplementary to Course 2A, especially to work of Section I, and intermediate between Course 2A and Course 12.

2 hrs., first half-year. Prerequisite: Course 2A in Physics and Course 9 or 3B in Mathematics.

10. **Electricity.** (G.E.) Assistant Professor RAYMOND.

Elements of the mathematical theory of electricity and magnetism, with some of the more important applications. Lectures.

2 hrs., first half-year. Tu Th, 10. Prerequisite: Course 2A or 4 in Physics; Course 9 or 3B in Mathematics. Elective, Junior year, in the College of Mechanics.

11A. **Electric Discharges through Gases.** (G.E.)
Associate Professor LEWIS.

Lectures, experimentally illustrated, on phenomena of the flame and electric arc, spark, and vacuum-tube; and on cathode rays, Röntgen rays, and Becquerel rays.

2 hrs., first half-year. Tu Th, 9. Prerequisite: Course 2A or 4. This course is recommended as preliminary to Course 11.

11. **Spectroscopy.** (G.E.) Associate Professor LEWIS.

Lectures, with experimental illustration, on methods and results of investigation, and spectroscopic theories.

2 hrs., second half-year. Tu Th, 9. Prerequisite: Course 8. Course 11A also will be found helpful.

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12. **Theory of Heat and Thermodynamics.** (G.E.) Dr. McKay.

Lectures twice a week; for Juniors and Seniors.

2 hrs., second half-year.

*12A. **Energetics.** (G.E.) Professor Slate.

A non-mathematical account of forms and transformations of energy. Lectures; open to qualified students.

2 hrs., first half-year.

12B. **Heat Measurements.** (G.E.) Dr. McKay.

Thermometry, Calorimetry, Pyrometry and general heat measurements, adapted for students of Physics, Chemistry, and Engineering. One lecture and one laboratory exercise a week.

4 hrs., second half-year; 2 units.

13. **Physical Optics.** (G.E.) Assistant Professor Raymond.

Laboratory exercises twice a week.

6 hrs., first half-year; 2 units. M F, 1-4.

14. **Advanced Physical Measurement.** (G.E.)

Assistant Professor Raymond.

Problems involving accurate measurement and mathematical work. Laboratory exercises twice a week.

6 hrs., first half-year; 3 units. Tu Th, 1-4. Elective, Senior year, in the College of Mechanics.

18. **Special Undergraduate Study.** (G.E.)†

Assistant Professor Raymond, Dr. Hall, and Dr. Minor.

All special laboratory work not included in courses announced above. Credit value to be fixed in each case. By special arrangement with the Professor of Physics, this course may be made the equivalent of parts of the regular laboratory work under Courses 1 and 3.

GRADUATE COURSES.

15. **Dynamics of Rotation.** Professor Slate.

Theory of the gyroscope, and related problems.

3 hrs., first half-year of 1905-06. Prerequisite: Course 5A.

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*Not to be given in 1905-06.

†May be chosen as advanced work by special arrangement only.

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15A. **Precession and Nutation.** Professor SLATE.

3 hrs., second half-year, in alternate years with Course 15. Prerequisite: Courses 5A and 15.

16. **Special Advanced Study and Research.** (G.E.)

Associate Professor LEWIS and Assistant Professor RAYMOND.

Laboratory work throughout the year, on problems assigned according to the preparation and needs of individual students. Credit value to be fixed in each case.

17. **Readings and Discussions.** Professor SLATE.

Work throughout the year, for Seniors and Graduate Students, upon topics selected by special arrangement. The following have been treated during the period 1899-1905: the development of the doctrine of conservation of energy; mathematical theory of electricity; theory of double refraction and polarization; electro-magnetic theory of light; theory of anomalous dispersion.

2 hrs., throughout the year.

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ASTRONOMY.

ARMIN O. LEUSCHNER, Ph.D., Sc.D., Associate Professor of Astronomy and Geodesy, and Director of the Students' Observatory.

SIDNEY D. TOWNLEY, Sc.D., Lecturer in Astronomy.

RUSSELL T. CRAWFORD, Ph.D., Instructor in Practical Astronomy.

BURT L. NEWKIRK, Ph.D., Instructor in Mathematics, Watson Assistant in Astronomy.

ADELAIDE M. HOBE, B.S., Watson Assistant in Astronomy.

Special Announcement. A special announcement concerning the facilities and the courses of instruction in the Berkeley Astronomical Department, and in the Lick Astronomical Department, at Mount Hamilton, has been published. Copies may be obtained from the Director of the Lick Observatory, Mount Hamilton, California, or from the Director of the Students' Observatory, Berkeley, California.

Courses 1A, 1B, 2, and 5 are designed especially to fulfill the requirement in prescribed Natural Science for students in the Colleges of General Culture.

A part of Courses 1A and 1B consists of special lectures at the regular hour by the Director and Astronomers of the Lick Observatory.

Geodesy, navigation, and nautical astronomy, especially adapted to the needs of students in the College of Commerce, will be included in Courses 2 to 4, but a special section for such students may be formed.

LOWER DIVISION COURSES.

1A. **Elements of Astronomy.** DR. CRAWFORD.

An introductory course. General facts and principles underlying the science of astronomy in all its branches.

2 hrs., first half-year. Tu Th, 11. Prerequisite to Geography 9.

1B. **Modern Astronomy.** Associate Professor LEUSCHNER, the Director and Astronomers of the Lick Observatory, DR. TOWNLEY.

Progress in astronomy through modern methods, especially spectroscopic and photographic.

3 hrs., second half-year. Tu Th, 11; S, 9.

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For observatory work in connection with Courses 1A and 1B students will ordinarily elect Course 2; but may, instead, take Course 4A or 4B, subject to the prerequisites announced.

2. **Supplement to Courses 1A and 1B.** Dr. CRAWFORD and ———.

Practice in observing in connection with Courses 1A and 1B. One or two evenings or afternoons a week at the observatory.

3 to 6 hrs., throughout the year, as the student may elect; 3 or 6 units. The observatory is open for this course two evenings, two afternoons, and S, morning. The course is open to students who are taking or have taken Course 1A or 3. One unit of this course is prerequisite to Geography 9.

UPPER DIVISION COURSES.

3A. **General Astronomy.** (G.E.) Dr. CRAWFORD.

3 hrs., first half-year. Hours to be arranged with the instructor. Prerequisite: Mathematics C and 5, and Physics 1 or 4. For observatory work in connection with this course, students may elect Course 2, 4A, or 4B, subject to the prerequisites announced.

3B. **General Astronomy.** (G.E.) Dr. CRAWFORD.

A continuation of Course 3A.

2 hrs., second half-year. Hours to be arranged with the instructor. Prerequisite: Course 3A.

4A. **Practical Astronomy.** (G.E.)

Associate Professor LEUSCHNER.

Lectures and observatory work. Geodesy, navigation, and nautical astronomy. Practical work at the observatory with sextant, clock, chronograph, transit-and-zenith telescope, equatorial telescope, photographic telescope, reflector, alt-azimuth instrument. Computing.

7 hrs., 3 units, first half-year; 8 hrs., 4 units, second half-year. First half-year, lecture Tu or Th, 9; observatory, Tu Th, 7-10 p.m.; second half-year, lectures Tu Th, 9; observatory, Tu Th, 7-10 p.m. Prerequisite: Mathematics C and 5; Physics 1 or 4; and either Course 1A or 3A in Astronomy. The course should also be preceded by a course in differential calculus.

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4B. **Practical Astronomy.** (G.E.) Dr. CRAWFORD and ———.

The subject-matter of Course 4A more briefly presented, and adapted to the needs of students of Civil Engineering.

7 hrs., 3 units, first half-year; 3 hrs., 1 unit, second half-year. First half-year, lecture, Tu or Th, 9, and two observatory periods; second half-year, one observatory period. The observatory is open for this course three evenings, and S, morning. The arrangement of the work depends so largely upon weather conditions, that the student should reserve for this course several observatory periods. Prerequisite for students not in the College of Civil Engineering: Mathematics C and 5; Physics 1 or 4; and either Course 1A or 3A in Astronomy. Prescribed, Senior year, in the Course in Railroad Engineering, College of Civil Engineering.

5. **History of Astronomy.** Dr. CRAWFORD.

3 hrs., second half-year. M W F, 1. Prerequisite: Course 1A or 3A.

6. **Theoretical Astronomy.** (G.E.)

Associate Professor LEUSCHNER.

4 hrs., throughout the year. Tu Th, 2-4. Prerequisite: Course 1A or 3A; Course 9 or 9B in Mathematics; ordinarily also Course 5 in Physics.

7. **Method of Least Squares.** (G.E.)

Associate Professor LEUSCHNER.

The fundamental principles and processes of the Method of Least Squares, and their application to the solution of astronomical, physical, and engineering problems.

2 or 3 hrs., first half-year. Tu Th, 10; W, 8. Prerequisite: Working knowledge of the differential and integral calculus. Prescribed, Junior year, two units, in the Course in Railroad Engineering, College of Civil Engineering.

†8. **Mechanical Quadratures.** (G.E.)

Associate Professor LEUSCHNER.

Development of the formulae of numerical differentiation and integration, and their application in the construction of tables.

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†A course covering the principal subject-matter of courses 8 and 9 was given in 1904-05. 1 hr., first half-year, W, 1; 2 hrs., second half-year, Tu, 2; F, 1.

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3 hrs., second half-year. Hours to be arranged with the instructor. Prerequisite: Course 9 or 9B in Mathematics. Offered alternately with Course 9.

†9. **Interpolation and the Use of Tables.** (G.E.)

Associate Professor LEUSCHNER.

The more useful formulae of interpolation, and their application in the use of astronomical and other tables. Practice in extensive numerical computations, with special aim at rapidity and exactness. Calculating machines.

3 hrs., second half-year. Hours to be arranged with the instructor. Prerequisite: Algebra and trigonometry. Offered alternately with Course 8.

10. **Determination of the Longitude and Latitude.** (G.E.)

Dr. CRAWFORD.

A continuation of Course 4. The students determine the longitude (by the telegraphic method) or the latitude (by the method of Talcott) of the Students' Observatory.

Hours and credit value to be arranged with the instructor. Prerequisite: Course 4A or 4B.

11. **Advanced Practical Astronomy.** (G.E.) Dr. CRAWFORD.

The theory of refraction; eclipses.

2 hrs., second half-year. Hours to be arranged with the instructor. Prerequisite: Course 4A or 4B.

GRADUATE COURSES.

12. **Theoretical Astronomy.**

Associate Professor LEUSCHNER.

This course treats of the relative accuracy of the various methods of determining preliminary orbits.

2 hrs., second half-year. Hours to be arranged with the instructor. Prerequisite: Course 6.

13. **Perturbations and Celestial Mechanics.**

Associate Professor LEUSCHNER.

Adapted to the needs and preparation of the students. The course may be continued through three years.

The following subjects are treated: General principles; special perturbations in rectangular and polar coördinates; method

†A course covering the principal subject-matter of courses 8 and 9 was given in 1904-05. 1 hr., first half-year, W, 1; 2 hrs., second half-year, Tu, 2; F, 1.

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of variation of constants; method of determining the absolute perturbations of the minor planets after Hansen, Newcomb, and Hill; Glydèn's method after Brendel's Theorie der kleinen Planeten. Bohlin's Gruppenweise Berechnung der Stoerungen. Selected topics from Tisserand's Mécanique Céleste. Poincaré's Les Nouvelles Méthodes de la Mécanique Céleste; Glydèn's works, etc.

4 hrs., throughout the year. M W, 2-4.

14. **Advanced Practical Astronomy.** (G.E.) Dr. CRAWFORD.

3 hrs., throughout the year; 1 unit each half-year. Hours to be arranged with the instructor. Prerequisite: Course 4A.

15. **Advanced Study and Research.**

Associate Professor LEUSCHNER and Dr. CRAWFORD.

Investigation of special problems to be selected according to the preparations and the needs of individual students.

Hours and credit value arranged in each case.

16. **Measurement and Reduction of Astronomical Photographs; Spectrograms.** Dr. NEWKIRK.

Either half-year. Hours and credit to be arranged with the instructor.

LICK OBSERVATORY.

The Lick Observatory at Mount Hamilton forms a separate department of the University. The unrivaled facilities for advanced astronomical work which are offered by the great telescope, in this favorable location, are too well known to require description here. The department is open to graduate students under regulations prescribed by the Regents. (See under Lick Astronomical Department.) The degrees of Master of Science and Doctor of Philosophy are offered to students who have fulfilled the required conditions. (See under Graduate Department.) For information relating to graduate work at the Observatory, intending students should address the Recorder of the Faculties, at Berkeley, or the Director of the Lick Observatory, at Mount Hamilton, Santa Clara County, California.

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GEOGRAPHY.

GEORGE DAVIDSON, Ph.D., Sc.D., Honorary Professor of Geodesy and Astronomy; Professor of Geography.

*RULIFF S. HOLWAY, A.B., M.S., Assistant Professor of Physical Geography.

†LINCOLN HUTCHINSON, M.A., Assistant Professor of Economic Geography.

LOWER DIVISION COURSES.

9. **Introductory Geography.** Assistant Professor HOLWAY.

Fundamental planetary relations in geography, including change of seasons and other effects of the earth's motions. Non-mathematical study of common map projections and of methods of making relief models. Lectures and laboratory work.

2 hrs., second half-year. Tu Th, 9.

Open to those who are taking or have taken Astronomy 1A and one unit of 2. Prescribed for admission to Courses 10 and 12 for candidates for the Teacher's Certificate in Physical Geography.

‡10. **Physiography of the Lands.** Assistant Professor HOLWAY.

Lectures, reading and reports, laboratory and field work. Primarily for those preparing to teach Physical Geography in the High Schools; includes a study of the present land forms and of the forces and processes that have resulted in these forms and of their effect upon human development. Laboratory work in the making and interpretation of maps and of relief models.

3 hrs., either half-year. M W F, 8.

12. **Meteorology.** Assistant Professor HOLWAY.

An elementary presentation of the principles of meteorology, the general circulation of the atmosphere, storms, the work of the Weather Bureau, and some consideration of climate in relation to plant and animal life. Laboratory work in observing and charting weather phenomena.

2 hrs., first half-year. Tu Th, 9.

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*Absent first half-year, 1905-06, visiting schools.
†Absent on leave first half-year, 1905-06.
‡Not to be given first half-year, 1905-06.

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†14. **Oceanography.** Assistant Professor HOLWAY.

An elementary course in the study of the ocean and the oceanic circulation; includes reading and reports and some laboratory work in mapping and interpreting the observations upon which our knowledge of the ocean is based.

2 hrs., first half-year. Tu Th, 10.

UPPER DIVISION COURSES.

1. **The Currents and Climatology of the Pacific Ocean.**
Professor DAVIDSON.

The geography, productions, and commerce of the countries bordering the Pacific Ocean and contiguous waters. The highways of commerce. The great canals. The great river and lake systems of the world. The geography of raw products. Tides. Submarine telegraph cables. The Colonial systems of the world.

3 hrs., first half-year. M W F, 2.

2. **The Currents and Climatology of the Pacific Ocean.**
Professor DAVIDSON.

Continuation of Course 1.

3 hrs., second half-year. M W F, 2.

15. **Physiography of California.** Assistant Professor HOLWAY.

A study of the physical features and climate of California.

2 hrs., second half-year. Tu Th, 2. Prerequisite: Geography 10 or Geology 1A.

COURSES IN OTHER DEPARTMENTS.

ECONOMIC GEOGRAPHY.

Introduction to Economic Geography. [See Economics 3.]
Assistant Professor HUTCHINSON.

***The Materials of Commerce.** [See Economics 4.]
Assistant Professor HUTCHINSON.

***Geography of International Trade.** [See Economics 4A.]

Commercial Resources of the Spanish-American Countries. [See Economics 38.]
Assistant Professor HUTCHINSON.

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†Not to be given first half-year, 1905-06.

*Not to be given in 1905-06.

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CHEMISTRY.

WILLARD B. RISING, M.E., Ph.D., Professor of Chemistry.

EDMOND O'NEILL, Ph.B., Associate Professor of Organic and Physiological Chemistry.

WALTER C. BLASDALE, Ph.D., Assistant Professor of Chemistry.

EDWARD BOOTH, Ph.B., Instructor in Chemistry.

HENRY C. BIDDLE, Ph.D., Instructor in Chemistry.

WM. CONGER MORGAN, Ph.D., Instructor in Chemistry.

FREDERICK G. COTTRELL, Ph.D., Instructor in Physical Chemistry.

Matriculation Chemistry, Subject 12*b*, is prerequisite to all courses in Chemistry, excepting Course 1A. To students who have not taken chemistry in the high schools, an opportunity to do preparatory work is offered in the Summer Session.

Courses 1 and 3 are prerequisite to all other Courses in Chemistry. Course 5A or 5B is prerequisite to Courses 9 to 31.

Laboratory deposits are fifteen dollars a half-year for Course 3, and ten to thirty dollars a half-year for the other laboratory courses. The average amount returned to the student at the end of the half-year, after deducting for cost of materials, gas, etc., actually used, and for breakage of apparatus, is about three dollars in Course 3, and about five dollars in the other courses.

LOWER DIVISION COURSES.

1. **General Inorganic Chemistry.** Dr. MORGAN.

Lectures, with study of a manual, and full experimental illustration.

3 hrs., throughout the year. Two sections. M W F, Section I, 9; Section II, 10. Usual prerequisite: Matriculation Chemistry, Subject 12*b*. This course is ordinarily taken in conjunction with Course 3. Prescribed, Freshman year, in the Colleges of Agriculture, Engineering and Chemistry.

3. **Laboratory: Qualitative Analysis.**

Mr. BOOTH and Dr. MORGAN.

Laboratory practice in qualitative analysis; designed to familiarize the student with the facts and principles of general inorganic chemistry.

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6 hrs., throughout the year; 2 units. Four sections. Section I, M F, 1-4, Dr. MORGAN; II, Tu Th, 9-12, Mr. BOOTH; III, Tu Th, 1-4, Mr. BOOTH; IV, W, 1-4, and S, 9-12, Mr. BOOTH. Prerequisite: Matriculation Chemistry, Subject 12*b*. Prescribed, Freshman year, in the Colleges of Agriculture, Engineering and Chemistry.

1A. **General Inorganic Chemistry.** Associate Professor O'NEILL.

Lectures and recitations, with study of a manual, and full experimental illustration.

2 hrs., throughout the year. Tu Th, 10. Prerequisite: At least Sophomore standing.

5A. **Laboratory: Quantitative Analysis—Gravimetric and Volumetric.** Assistant Professor BLASDALE.

Elementary course in the principles of quantitative analysis; practice in gravimetric and volumetric analysis, with weekly lectures and discussions.

9 hrs., first half-year; 3 units. M W F, 1-4. Prescribed, optionally with 5B, in the College of Chemistry. Prerequisite, alternatively with 5B, to Courses 9 to 31.

5B. **Laboratory: Quantitative Analysis—Gravimetric.** Assistant Professor BLASDALE.

General principles; practice in gravimetric determinations, with weekly lectures and discussions.

9 hrs., first half-year; 3 units. Two sections. Section I, M W F, 1-4; II, Tu Th, 1-4, and S, 9-12. Prescribed, Sophomore year, in the Colleges of Mining and Chemistry, and, optionally with 5A, to students in the College of Agriculture who intend to elect work in the Agricultural and Viticultural Laboratories.

6. **Laboratory: Quantitative Analysis—Volumetric.** Assistant Professor BLASDALE.

General principles, with weekly lectures and discussions.

9 hrs., second half-year; 3 units. Two sections. Section I, M W F, 1-4; II, Tu Th, 1-4, and S, 9-12. Prerequisite: Course 5A or 5B. Prescribed, Sophomore year, in the Colleges of Mining and Chemistry.

8A. **Organic Chemistry.** Associate Professor O'NEILL.

Elementary introductory course. Lectures and recitations, with experiments.

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2 hrs., first half-year. Tu Th, 8. Prescribed, Sophomore year, in the College of Chemistry.

8B. **Organic Chemistry.** Dr. BIDDLE.

Continuation of Course 8A. Prescribed, Sophomore year, in the College of Chemistry.

2 hrs., second half-year. Tu Th, 8. Prerequisite: Course 8A.

UPPER DIVISION COURSES.

7A. **Inorganic Chemistry.** (G.E.) Professor RISING.

Advanced lectures on the chemistry of the metals, designed particularly for mining students.

2 hrs., throughout the year. M F, 8.

*7B. **Inorganic Chemistry: Laboratory.** (G.E.) Professor RISING.

A few students will be admitted to this course, and will be assisted in making special preparation of metallic compounds. Competent students will be able to pass to original investigation. The credit value will be fixed in each case.

9A. **Organic Chemistry.** (G.E.) Dr. BIDDLE.

Advanced course. Chemistry of the aliphatic derivatives. Lectures and recitations, with references to original articles on special topics.

3 hrs., first half-year. M W F, 9. Prerequisite: Courses 8A and 8B.

9B. **Organic Chemistry.** (G.E.) Dr. BIDDLE.

Advanced course. Chemistry of the benzene derivatives and cyclic compounds in general. Lectures and recitations, with references to original articles on special topics.

3 hrs., second half-year. M W F, 9. Prerequisite: Courses 8A and 8B.

10A. **Laboratory: Organic.** (G.E.) Dr. BIDDLE.

Supplementary to Courses 8A, 8B, 9A, and 9B. Prescribed, Junior year, in the College of Chemistry. Preparation of organic compounds, and methods of analysis. Prerequisite: Course 8A. Course 8B should also precede or accompany this course.

9 hrs., either half-year; 3 units. M W F, 1-4.

*Not to be given in 1905-06.

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10B. **Laboratory: Organic.** (G.E.) Dr. BIDDLE.

Continuation of Course 10A.

6 to 15 hrs., either half-year; 2 to 5 units.

11. **Physical Chemistry.** (G.E.) Dr. COTTRELL.

A discussion of the principles of chemistry and the relations of chemistry to physics.

2 hrs., throughout the year. Tu Th, 9. Prerequisite: Courses 5A or 5B, and 8A. Physics 1, 2A, 3.

12. **Laboratory: Physical Chemistry.** (G.E.) Dr. COTTRELL.

A series of laboratory experiments in connection with Course 11.

6 or 9 hrs., second half-year; 3 units. M W F, 1-4. Prerequisite: same as for Course 11. Prescribed, Junior year, in the College of Chemistry.

14A. **Chemical Technology.** (G.E.) Associate Professor O'NEILL.

The chemistry and manufacture of the more important technical chemical products.

2 hrs., second half-year. Tu Th, 8. Prerequisite: Courses 9A or 9B, 10, and 11.

14B. **Chemical Technology: Laboratory.** (G.E.)

Associate Professor O'NEILL.

Laboratory work supplementary to 14A.

6 hrs.; 2 units, second half-year. Tu Th, 1-4. Prerequisite: Same as for 14A, and 5, and 6.

16. **Ore Analysis.** (G.E.)

Assistant Professor BLASDALE.

Special method of analysis of minerals and ores of complex composition.

6 hrs., second half-year; 2 units. Tu Th, 1-4. Prerequisite: Courses 5A or 5B, and 6; Physics 3.

*17A. **Chemistry of Structural Materials.** Mr. BOOTH.

Chemical character and methods of manufacture of materials of construction.

2 hrs., first half-year. Tu Th, 4.

*Not to be given in 1905-06.

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23. **Thermo-Chemistry.** (G.E.) Professor RISING.

Lectures, with reference to the original literature. For Graduates and advanced undergraduates. Prerequisite: Courses 8A and 11.

2 hrs., first half-year. Tu Th, 10.

*24. **Selected Topics in Organic Chemistry.** (G.E.) Dr. BIDDLE.

Lectures, with references to original literature.

2 hrs., first half-year. Tu Th, 8. Prerequisite: Courses 9A or 9B, and 10A.

25. **Explosives.** (G.E.) Professor RISING.

2 hrs., second half-year. Tu Th, 10. Prerequisite: Courses 5A or 5B, and 6.

*26. **Rare Metals.** (G.E.) Mr. BOOTH,

Lectures and discussions on some of the more important rare elements.

2 hrs., second half-year. M, 4. Prerequisite: Course 5A or 5B.

27. **History of Chemistry.** (G.E.) Associate Professor O'NEILL.

The development of modern Chemistry.

2 hrs., first half-year. Tu Th, 10. Prerequisite: Courses 9A or 9B, 10A, 11.

28. **Teachers' Course.** (G.E.) Dr. MORGAN.

Training course for students intending to become teachers of chemistry. 4 hours, throughout the year: 1 hour lecture, 1 period (3 hrs.) assisting in laboratory instruction, and 2 periods (6 hrs.) of laboratory work. The instruction will be participated in by all the department instructors. Prerequisite: Courses 5A or 5B, 8.

Courses 1, 3, 5A, 8, and 28 are prerequisite for a teacher's recommendation in chemistry.

29. **Summer Course.**

A course of practical laboratory exercises especially adapted to the needs of teachers in the secondary schools of the State, supplemented by lectures upon the principles involved. [See Summer Session announcement.]

30. **Special Undergraduate Study and Research.** (G.E.)

All special laboratory work not included in the courses announced above. Credit value to be fixed in each case.

*Not to be given in 1905-06.

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Courses under 30 and 31 are given by all instructors in the department, accordng to circumstances. See schedule of exercises.

GRADUATE COURSES.

31. **Graduate Course.**

Work adapted to the special needs of each student. Credit value to be fixed in each case.

32. **Thesis Work in Chemistry.**

The opportunities which the Chemical Department offers for graduate study may be stated as follows: *(a) Work in the Chemical Seminary,* including readings from the original literature, with criticisms, suggestions, and examinations, verifications of important statements, etc.; *(b) Investigations in the Chemical Laboratory.*

The Chemical Seminary is open to Graduate Students, and to advanced undergraduates who have made exceptional attainments. The meetings of the Seminary will be weekly, at which members will be required to present the results of their study and investigation. These will be subject to criticism and inquiry.

Courses are so arranged that the assignment of work is individual and can be adapted to the special wants of the student. The progress of the student will be determined solely by his industry and ability to grasp the subject. The students and instructors of the department will meet in the Seminary and listen to the presentation and discussion of the results of study by the members. Special research work will be assigned to students, which they will be expected to carry out under the guidance of the Professor of Chemistry. This is regarded as the most important work of the student, and all possible help and encouragement will be given in carrying it out.

The laboratories are commodious and adapted to the work of research. The supply of modern apparatus is ample, and will be placed at the disposal of competent students.

The Library of the University, supplemented by the private libraries of the professors, will give the student access to practically the whole literature on the subject.

COURSES IN OTHER DEPARTMENTS.

Agricultural Chemistry.

See Agriculture, Horticulture, and Entomology.

Assaying. See under Mining.

Blowpipe Analysis. See under Mineralogy.

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BOTANY.

WILLIAM A. SETCHELL, Ph.D., Professor of Botany.

*WILLIS L. JEPSON, Ph.D., Assistant Professor of Botany.

WINTHROP J. V. OSTERHOUT, Ph.D., Assistant Professor of Botany.

HARVEY M. HALL, M.S., Instructor in Botany and Assistant Botanist to the Experiment Station.

NATHANIEL L. GARDNER, M.S., Assistant in Botany.

Courses 1, 2, and 3 are elementary courses and may be counted for prescribed science in the Colleges of Letters, Social Sciences and Natural Sciences. Course 14 is also elementary, but as it deals more largely with applied Botany, is recommended to students in the Colleges of Commerce, Chemistry, and Agriculture. Courses 4 and 5 are of especial value to students of Forestry. Courses 2 (with its prerequisites), and 3, lead up to advanced work in this department. Those desiring teachers' certificates are advised to take Courses 4, 5, and 9, with the prerequisites, but should consult with the head of the department early in their course. Lecture courses in Summer Session are equivalent to Course 1 in part, and credit will not be given for both.

A laboratory fee of two dollars and a half will be imposed each half-year for each laboratory course. This rule applies to Courses 2, 3, 5, 6, 7, 9, 11, 12, 13, 14, 25, 26, and 27.

LOWER DIVISION COURSES.

1. **Fundamentals of Botany.** Professor SETCHELL.

Lectures, illustrated as far as possible by means of specimens, diagrams, and preparations; designed to set forth in a general way the important facts, problems and theories with which botanical science is concerned.

3 hrs., throughout the year. Tu Th S, 8.

2. **General Plant Physiology.**

Assistant Professor OSTERHOUT and Mr. GARDNER.

Experimental investigation of the fundamental life-processes of the plant, with especial reference to the relation of the plant to its environment.

*Absent on leave, 1905-06.

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6 hrs., first half-year; 3 units. Tu Th S, 8-10. Prerequisite: Chemistry, at least Course 1.

3. **General Plant Morphology.** Mr. GARDNER.

Morphological study of types of flowering plants, with especial reference to the organs of reproduction.

6 hrs., second half-year; 3 units. Tu Th S, 8-10.

UPPER DIVISION COURSES.

*4. **General Phaenogamic Botany.** (G.E.)
Assistant Professor JEPSON.

The structure, morphology, and relationships of the orders of seed plants. The second half-year is devoted to a study of the habits of growth, structure and classification of forest trees, accompanied by lectures upon the forest regions of North America and by field work.

6 hrs., throughout the year; 3 units each half-year. Tu Th S, 10-12, with field work to be arranged. Prerequisite: Courses 2 and 3.

5. **General Cryptogamic Botany.** (G.E.) Professor SETCHELL.

A general study of the orders of spore-bearing plants from the points of view of structure, development, and economic importance. Laboratory work and informal lectures.

6 hrs., laboratory, 1 hr. lecture, throughout the year; 3 units each half-year. Tu Th, 1-4. Prerequisite: Course 3.

6. **Phycology and Mycology.** (G.E.) Professor SETCHELL.

Laboratory work upon the structure, development, and classification of the algae, fungi, and lichens, with informal lectures and the assignment of outside reading. Intended for students who desire some critical knowledge of the lower cryptogamous orders. To be offered in alternate years.

6 hrs., throughout the year; 3 units each half-year. Hours to be arranged with the instructor. Prerequisite: Course 5.

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*During the year 1905-06, on account of the absence of Assistant Professor JEPSON, the arrangements for Course 5 will be as follows: 4*a*, dealing with the general morphology of the Phaenogams, will be given the first half-year by Mr. HALL; 4*b*, dealing with forest botany, will be given the second half-year by Professor SETCHELL. Otherwise the course will conform to the announcement given above.

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*7. **Pteridology and Bryology.** (G.E.) Professor SETCHELL.

The structure, development, and classification of the higher cryptogams (hepatics, mosses, ferns, and fern allies) will be treated in the same way as the lower crytogams in Course 6. To be offered in alternate years.

6 hrs., throughout the year; 3 units each half-year. W F, 9-12. Prerequisite: Course 5.

9. **Vegetable Histology.** (G.E.) Assistant Professor OSTERHOUT.

A laboratory course in the microscopical anatomy of the higher plants, treated with reference to function and the influence of environment. It includes practice in embedding, use of the microtome, staining on the slide, microchemical tests, etc. Laboratory work and lectures.

6 hrs., throughout the year; 3 units each half-year. M F, 1-4. Prerequisite: Courses 2 and 3.

11. **Vegetable Cytology.** (G.E) Assistant Professor OSTERHOUT.

The anatomy and physiology of the cell, including cell division, chromosome reduction, fertilization, and a consideration of heredity and development from the standpoint of cytology. Laboratory work and lectures.

6 hrs., throughout the year; 3 units each half-year. M F, 1-4. Prerequisite: Course 9.

*12. **Morphology of the Compositae.** (G.E.)
Assistant Professor JEPSON.

Studies in the general morphology of the group, followed by the critical examination of various West American genera.

6 hrs., throughout the year; 3 units each half-year. Tu Th S, 10-12. Prerequisite: Course 4.

*13. **Taxonomy and Phylogeny of the Phaenogams.** (G.E.)
Assistant Professor JEPSON.

Laboratory work on the classification of the seed plants; considering the characters and affinities of the classes and more important orders, accompanied by informal discussions of phylogenetic problems.

6 hrs., throughout the year; 3 units each half-year. Tu Th S, 10-12. Prerequisite: Courses 4 and 5. To be offered in alternate years.

*Not to be given in 1905-06.

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†14. **Economic Botany.** Mr. H. M. HALL.

Laboratory work on the morphology, relationships, properties, and geogrophical distribution of the plant families which furnish important commercial products and agricultural crops, accompanied by lectures on the uses, origin, cultivation, collection, and commerce of plant products.

6 hrs., first half-year; 3 units. M W F, 8-10.

GRADUATE COURSES.

25. **Advanced Cryptogamic Botany.** Professor SETCHELL.

The crytogams of California offer exceptional opportunities for research, and many simpler problems are presented for original investigation. This work during the year will be confined almost exclusively to the algae, in connection with the special work of the instructor. Students should expect to devote considerable time to this course.

*26. **Advanced Phaenogamic Botany.** Assistant Professor JEPSON.

Special problems requiring the original investigation of some particular order or smaller group of flowering plants. This course involves work in the field as well as in the laboratory.

27. **Advanced Histology and Cytology.**
Assistant Professor OSTERHOUT.

Special problems in histology or cytology will be assigned to properly prepared students. M F, 1-4.

28. **Advanced Economic Botany.** Mr. H. M. HALL.

Special problems in agrostology (either systematic or economic) and other branches of economic botany.

6 hrs., throughout the year; 2 units each half-year. M W, 1-4. Prerequisite: Course 14.

30. **Botanical Seminary.**
Professor SETCHELL and Assistant Professor OSTERHOUT.

Graduates and advanced undergradates meet once or twice a month for the discussion of special topics.

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*Not to be given in 1905-06.

†During the year 1905-06 this course will be united with Course 4A.

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ZOOLOGY.

WILLIAM E. RITTER, Ph.D., Professor of Zoology.

CHARLES A. KOFOID, Ph.D., Associate Professor of Histology and Embryology.

JOHN C. MERRIAM, Ph.D., Assistant Professor of Palaeontology and Historical Geology.

HARRY B. TORREY, Ph.D., Assistant Professor of Zoology.

ALICE ROBERTSON, Ph.D., Assistant in Zoology.

The courses are planned to meet the needs of three classes of students, viz.:

1. Those who wish, for the purpose of general culture, some knowledge of the subject-matter, methods and generalizations of biological science on its animal side. For this class Courses, 1, 2, 3, 7, and 17 are particularly suited.

2. Those preparing to become teachers and investigators. For such the individual aims of the student will determine, after the fundamental courses have been taken, what advanced courses should be selected. The minimum for the Teachers' Recommendation is 1 (lectures only), 2, 3, either 4 or 5, 7 and 17.

3. Those preparing for the study of medicine. For these, Courses 1 (lectures only), 2, 3, 4, and 5 or 6 are requisite to fulfil the requirements of the Pre-Medical Course.

Laboratory deposit is seven dollars for each laboratory course. The amount returned at the end of the course will depend upon the actual cost of the material consumed, the character and amount of the apparatus used, and the breakage.

LOWER DIVISION COURSES.

1. **The Fundamentals of Zoology.**

Professor RITTER and Dr. ROBERTSON.

The underlying principles of animal life and evolution. The treatment is topical rather than systematic. Illustrated lectures and laboratory demonstrations.

2 or 3 hrs., throughout the year. Lectures Tu Th, 11; demonstrations, 5 sections, W, 11-5.

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The demonstrations consist in the examination in the laboratory for an hour a week by each student, of preparations and models illustrating the subject-matter of the lectures. Open for credit only to those in the lecture course who are not to take any laboratory work in Zoology.

2. **General Zoology.** Assistant Professor TORREY.

A consideration of some of the general problems of biology as exemplified, primarily, among animal types. Lectures or recitations one hour, laboratory five hours per week.

6 hrs., first half-year; 3 units. Section I, M F, 1-4; II, Tu Th, 1-4. Prerequisite: Course 1. Course 2 should be taken coincidently with Course 1 when possible.

3. **General Zoology.** Assistant Professor TORREY.

Supplementary to Course 2. The anatomy and development of the salamander will be the basis of the laboratory work.

6 hrs., second half-year; 3 units. Section I, M F, 1-4; II, Tu Th, 1-4. Prerequisite: Course 2.

4. **Comparative Anatomy of the Higher Vertebrates.**
Professor RITTER and Assistant Professor MERRIAM.

A continuation of Course 3. Designed largely for students preparing to study medicine. The osteological part of the work is done under Assistant Professor MERRIAM. [See Geology 11.]

8 hrs., first half-year; 4 units. Tu W Th, 1-4, and S, 8-12; each student to work on any *three* of the *four* possible periods. Laboratory work, recitations, and assigned topics; allotment of time for each to be arranged with the class.

UPPER DIVISION COURSES.

5. **Cytology and Microscopical Technique.**
Associate Professor KOFOID.

Structure and physiology of the cell in growth and reproduction. Methods of preparation of animal tissues for microscopical study.

8 hrs., first half-year; 4 units. Tu Th, 9; Tu Th, 1-4. Prerequisite: Course 3.

6. **Embryology.** Associate Professor KOFOID.

The phenomena of animal development, fundamental facts of reproduction, comparative vertebrate embryology. Lectures, recitations, and laboratory.

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8 hrs., second half-year; 4 units. Tu Th, 9; Tu Th, 1-4. Prerequisite: Courses 2 and 3.

6A. **Lectures on Embryology.** Associate Professor KOFOID.

Demonstrations and papers.

4 hrs., second half-year; 2 units. Tu Th, 9; Tu Th, 1. Prerequisite: Course 3.

7. **Advanced Invertebrate Zoology.** Associate Professor KOFOID.

Lectures, laboratory, and field work, with special reference to local fauna, both marine and fresh water. May be taken independently of Course 7A.

7 hrs., first half-year; 3 units. Lectures, W, 9; laboratory, W, 1-4, and 3 hours to be arranged. Prerequisite: Course 3.

7A. **Advanced Invertebrate Zoology.** Associate Professor KOFOID.

Lectures and laboratory work upon the morphology and taxonomy of lower invertebrates, with special reference to animal parasites. This course is especially designed for prospective students of medicine, and veterinary and agricultural sciences.

7 hrs., second half-year; 3 units. Lectures, W, 9.; laboratory, W, 1-4, and 3 hours to be arranged. Prerequisite: Course 3.

17. **Advanced General Vertebrate Zoology.** Professor RITTER.

An extension in the direction of systematic and ecological Zoology of the work done in Course 3; particularly adapted to the needs of those seeking the Teacher's Recommendation in Zoology. The work is confined mostly to the birds reptiles, and amphibians of California. Recitations, field and laboratory work, and papers on assigned topics.

3 units, second half-year. Th, 1-4; S, 8-12. Prerequisite: Course 3.

19. **Problems in Marine Biology.** Professor RITTER, Associate Professor KOFOID, and Assistant Professor TORREY.

The presentation, in general lectures, of various of the larger problems of the life of the sea, based largely on investigations by members of the department.

1 hr., second half-year. The course is without prerequisite, and without credit unless accompanied by prescribed reading and topical study previously arranged for with the head of the department.

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GRADUATE COURSES.

8. **Seaside Laboratory.**

During the summer vacations, work in zoology is transferred to the seashore, and, as far as possible, the work done there is made an integral part of the work of this department of the University. During the summer of 1905 the laboratory will again be at San Diego, and will be devoted exclusively to research and advanced individual instruction.

10. **Research Work.** Professor RITTER, Associate Professor KOFOID, and Assistant Professor TORREY.

Original study on special topics, in the field and laboratory.

11. **Advanced Cytology.** Associate Professor KOFOID.

The structure and activities of the cell, with special reference to the phenomena of heredity and development. Given in alternate years, at the option of the instructor.

Second half-year; 3 units. Laboratory and thesis. Prerequisite: Course 5. Hours arranged.

12. **Zoological Seminary.** Assistant Professor TORREY.

Designed for the discussion of special topics, and to familiarize students with the most important contemporaneous advances in this field of science. A reading knowledge of German or French is essential.

1 hr., throughout the year. Hour to be arranged. The fitness of students for this course will be determined in each case.

The work done during the last few years, particularly on the marine invertebrate fauna of the Pacific Coast, has served to reveal more and more clearly the richness, in many respects unique, of the opportunities here afforded for making important contributions to zoological science.

The museum collections are all accessible to students pursuing advanced studies, and are particularly valuable to those who undertake investigations in marine invertebrate zoology.

In the University Library and the various libraries of San Francisco, particularly that of the California Academy of Sciences, the student is able to reach the greater part of the most important zoological literature. The results of studies that are carried sufficiently far to make them distinctly contributions to the science are published by the University in the zoological series of publications.

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COURSES IN OTHER DEPARTMENTS.

Entomology. See under Agriculture.

Palaeontology. Courses 5A and 6A (see Geology) may be taken as advanced work in Zoology by special arrangement with the department.

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PHYSIOLOGY.

JACQUES LOEB, M.D., Professor of Physiology.

JOHN B. MACCALLUM, A.B., M.D., Assistant Professor of Physiology.

FRANK W. BANCROFT, Ph.D., Assistant Professor of Physiology.

SAMUEL STEEN MAXWELL, Ph.D., Instructor in Physiology.

THEODORE C. BURNETT, M.D., Assistant in Physiology.

K. W. WOLFGANG OSTWALD, Assistant in Physiology.

T. BRAILSFORD ROBERTSON, Assistant in Physiology.

ST. CLAIRE MCKELVEY, Technical Assistant in Physiology.

The courses in Physiology are arranged to meet the needs of several classes of students.

For the general student, who wishes to obtain some elementary information concerning the structure and functions of the organs of the human body, Course 1 is offered.

For the medical student, a series of courses is given which is similar to the courses in Physiology offered in the Eastern medical schools. Students wishing to enter the Medical Department of the University of California will receive credit for the work done in this department and will not be required to take the course in Physiology in the Medical Department. Such students are advised to take, in order, Courses 2, 3, and 4, which correspond to the Physiology required in the Medical Department.

Students electing Physiology as a minor subject for the degree of Ph.D. should take the courses recommended to the medical students, and, in addition, the Seminar, and at least one term of Advanced Physiology.

Finally, attention should be called to the fact that the equipment of the department offers unusual opportunities for research.

LOWER DIVISION COURSES.

1. **Introductory Physiology.** Assistant Professor BANCROFT.

The structure and functions of the human body. Lectures, recitations, demonstrations and laboratory.

The lectures may be accompanied, if desired, by a 3 hour period of laboratory and demonstration which will serve to illustrate the facts and methods of Physiology.

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3 or 6 hrs; 3 or 4 units; first half-year. Lectures M W F, 9; laboratory W, 1-4.

UPPER DIVISION COURSES.

2. **Physiology of the Blood, Circulation, Respiration, Secretion, Metabolism, and Animal Heat.** (G.E.) Dr. MAXWELL.

Lectures, recitations, and laboratory.

9 hrs., second half-year; 5 units. Lectures and recitation M W F, 9; laboratory, Tu Th, 1-4. Prerequisite: Course 1, Chemistry 1, 2, 3, and 4; Physics 1.

3. **General Physiology and Experimental Biology.** (G.E.)

Professor LOEB, Assistant Professor BANCROFT, and Dr. OSTWALD.

General theory of life phenomena. Lectures and laboratory. The lectures may be taken without the laboratory.

10 hrs., first half-year; 6 units. Prerequisite: Course 2. Lectures, M W F, 10; laboratory, M W F, 1-4.

4. **Physiology of the Central Nervous System and Special Senses.** (G.E.) Assistant Professor BANCROFT.

Lectures and laboratory.

9 hrs., 5 units; second half-year. Prerequisite: Same as for Course 2. Lectures, M W F, 8; laboratory, M F, 1-4.

GRADUATE COURSES.

11. **Advanced Physiology.**

First half-year, Professor LOEB.
Second half-year, Assistant Professor BANCROFT and Dr. MAXWELL.

Laboratory work three afternoons a week, with occasional lectures. May be taken either by students who have had adequate training in Botany and Zoology, or by those who have had adequate preparation in Chemistry and Physics. Students who wish to take the Course should apply personally to Professor Loeb.

12. **Research work in Physiology.** Professor LOEB.

Students who wish to take this Course should apply personally to Professor Loeb.

13. **Seminar.** Professor LOEB.

Monday, 4-5. Open to students of Courses 3, 4, 11, and 12.

For courses in Physiology given in the College of Medicine, consult the Announcement of the College of Medicine.

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HYGIENE.

GEORGE F. REINHARDT, B.S., M.D., Professor of Hygiene and Medical Examiner.

CHARLES R. GREENLEAF, M.D., Brig. Gen. U.S.A., retired; Honorary Professor of Military and Public Hygiene.

ARCHIBALD R. WARD, B.S.A., D.V.M., Assistant Professor of Bacteriology and Director of the State Hygienic Laboratory.

ELEANOR STOW BANCROFT, M.D., Lecturer in Hygiene and Medical Examiner of Women.

MARGARET HENDERSON, B.S., Assistant in the State Hygienic Laboratory.

All students who have been absent from classes on account of illness are required to report themselves to one of the two Medical Examiners, and to obtain the Medical Examiner's certificate before returning to the University.

LOWER DIVISION COURSES.

1. **General Hygiene.**

Professor REINHARDT and Dr. E. S. BANCROFT.

Lectures on personal hygiene, first aid to the injured, and general sanitation, including the consideration of infectious diseases, and the problems of public health protection.

2 hrs., first half-year. Tu Th, 11. Two sections. Section I, for men, Professor Reinhardt; Section II, for women, Dr. Bancroft. Prescribed to all undergraduates during their first year of residence.

UPPER DIVISION COURSES.

2. **Hygiene and Anatomy.** Professor REINHARDT.

Lectures, planned primarily for students of physical training, on the nature and the development of the human body and on prophylaxis and sanitation.

1 hr., second half-year. W, 11.

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3. **Bacteriology.** Assistant Professor WARD.

This course is designed during the first term to provide the student with an elementary knowledge of bacteria and of the laboratory methods of studying them. In the second term, a detailed study will be made of some pathogenic organisms of importance in human and veterinary medicine.

7 hrs., throughout the year; 3 units, each half year. Lecture M, 2, and 6 hrs. of laboratory work at periods to be arranged.

4. **Advanced Bacteriology.** Assistant Professor WARD.

Advanced study preparatory to and including investigation of special problems in pathological and dairy bacteriology. Conferences, laboratory, and topical readings.

Prerequisite: Course 3, or its equivalent. Credit and hours to be arranged.

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GEOLOGY.

ANDREW C. LAWSON, Ph.D., Professor of Geology and Mineralogy.

JOHN C. MERRIAM, Ph.D., Assistant Professor of Palaeontology and Historical Geology.

HARRY O. WOOD, M.A., Instructor in Mineralogy and Geology.

There are no laboratory deposits in this department.

LOWER DIVISION COURSES.

1A. **General Geology: Dynamical and Structural.**

Professor LAWSON.

Lectures.

3 hrs., first half-year. M W F, 10. Prerequisite: Elementary Chemistry and Physics. Prescribed, Junior year, in the Course in Sanitary Engineering, and Senior year, in the Course in Railroad Engineering, College of Civil Engineering; and Junior year, in the College of Mining.

1B. **General Geology: Historical.**

Assistant Professor MERRIAM.

Lectures.

2 hrs., second half-year. Tu Th, 10. Prerequisite: Course 1A or 5.

5. **General Palaeontology.** Assistant Professor MERRIAM.

The general principles of the study of fossil organisms.

2 hrs., first half-year. Tu Th, 10. Preparatory to Geology 1B. Recommended as preliminary: Zoology 1A.

UPPER DIVISION COURSES.

2. **Field Geology.** (G.E.) Professor LAWSON.

An inquiry by the student into the geological conditions which obtain in the region around the Bay of San Francisco, with occasional more extended excursions to points of especial interest; training in methods of field-observation and in interpretation of results.

1 unit, first half-year; 2 units, second half-year. Year course; fifteen field-days during the year. Prerequisite: Senior standing; Course 1A in Geology; Course 1 in Mineralogy. Prescribed, Senior year, in the College of Mining. Students

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taking this course may be called upon to make excursions entailing an outlay for traveling expenses of $20.00.

2A. **Economic Geology.** (G.E.) Professor LAWSON.

Lectures.

3 hrs., second half-year. M W F, 10. Prerequisite: Geology 1A and Mineralogy 1. Prescribed, Senior year, in the College of Mining.

3. **Petrography.** (G.E.) Professor LAWSON.

Principles and methods of investigation of rock-forming substances, with special discussion of the most important ones. General petrology. Systematic petrography.

2 hrs., first half-year. Tu Th, 11. Prerequisite: Course 1A; Courses 2 and 2C in Mineralogy. Prescribed, Senior year, in the College of Mining.

4. **Petrographical Laboratory.** (G.E.)

Professor LAWSON and Mr. WOOD.

(*a*) Demonstrations of the different methods of investigation of the rock-forming minerals and rocks. (*b*) Practice in the determinations of rocks by modern petrographical methods; preparation of thin sections, and the use of the polarizing microscope.

3 hrs., first half-year; 1 unit; 6 hrs., second half-year; 2 units.

First half, Section I, M, 1-4; II, W, 1-4. Second half, Section I, M, 1-4; W, 1-3; II, W, 3-5; F, 1-4. Prerequisite: Course 1A in Geology; Course 2A, 2B, and 2C in Mineralogy. Prescribed, Senior year, in the College of Mining.

7. **Physical Geology of North America.** (G.E.)

Professor LAWSON.

Lectures.

2 hrs., first half-year. M W, 3. Prerequisite: Course 1A in Geology, and Course 1 in Mineralogy.

5A. **Palaeontological Laboratory.** (G.E.)

Assistant Professor MERRIAM.

A study, principally from the biological standpoint, of the most important extinct forms.

4 hrs., first half-year; 2 units. M W, 1-4. Prerequisite: Course 5 completed, or in progress.

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6A. **Practical Work in Palaeontological Geology.** (G.E.)
Assistant Professor MERRIAM.

Given in connection with Course 1B. Laboratory work and excursions. For the purpose of studying the fossils and geological horizons of the Coast Ranges in the field, excursions to points of interest near Berkeley are made on convenient Saturdays during the term.

4 hrs., second half-year; 2 units. (1 unit laboratory, 1 unit excursion.) Open to students who have completed or are taking Course 1B.

11. **Vertebrate Palaeontology.** (G.E.)
Assistant Professor MERRIAM.

Comparative osteology, history, and affinities of the most important types of recent and fossil vertebrates.

3 hrs., first half-year. Lectures, M W, 9; laboratory work, W or F, 1-4. Prerequisite: Course 5 in Geology, or Course 1A in Zoology.

Geological History of Man. [See Anthropology 4.]
Assistant Professor MERRIAM.

GRADUATE COURSES.

8. **Advanced Palaeontological Laboratory.**
Assistant Professor MERRIAM.

Studies in lines of descent. Practical work in the palaeontology and organic geology of California.

Throughout the year. Credit value to be determined in each case. Prerequisite: Course 5A or 11.

10. **Inorganic Geology.** Professor LAWSON.

Discussions of special topics and advanced problems. Critical reviews of current literature. Prosecution of original geological research and publication of results. Methods of geological surveying and cartography. Petrographical studies.

9. **Geology of California.** Professor LAWSON.

Seminary.

2 hrs., second half-year. M W, 3. Prerequisite: Courses 1A, 1B, 12, Mineralogy 1.

For purposes of training in research, there is probably nowhere a more inviting geological field than that which lies immediately at the gates of the University of California. In nearly all depart-

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ments of geology the problems offered to the students are varied and interesting. In the treeless region between Berkeley and Mt. Diablo, and on the San Francisco and Marin peninsulas, there are magnificent illustrations of mountain structure, and the opportunities for acquiring skill in stratigraphy and in the interpretation of structural phenomena could scarcely be surpassed. The strata of the region are replete with Cretaceous and Tertiary fossils. The igneous rocks range in character from the most acid to the most basic, and include plutonic intrusives, dykes, and volcanic flows. In themselves and in the metamorphic contact zones, which they have developed in the adjoining country rock, they afford to the student of petrography abundant material for study. In dynamic geology the operation of wave, wind, and stream in the evolution of geomorphic form, is finely illustrated, as are, also, the phenomena due to vertical oscillations of the coast. The facilities for local field work are ample. The region adjacent to the Bay of San Francisco, from Mount Hamilton northward, is being mapped topographically by the United States Geological Survey, and excellent contour maps are becoming available as the work proceeds. These maps are made the basis of instruction in geological cartography.

In the wider field of the entire State, many broad and philosophic problems in geological science grow upon the student as he becomes familiar with the structure and physiography of the country. Movements of vast extent have occurred on the western margin of the continent in the most recent times, and the conditions for their study are most favorable. Such questions as are involved in the doctrine of isostacy and in the theories of orogeny and epeirogeny are constantly suggested to the student by his environment. The new science of geomorphology could scarcely find a more promising field for the concrete illustration of its principles. In the Sierra Nevada, studies in glaciology may be pursued to great advantage. In petrology and mineralogy a large and inviting field awaits the investigator. The economic geology of the State has as yet been but partially studied.

In palaeontology and historical geology, California offers unlimited material to the student desirous of engaging in research. Almost the entire geological column from the Cambrian to the Quaternary is represented by fossiliferous horizons; and, although valuable contributions to the palaeontology of the State have been made by Conrad, Gabb, and others, many of the more important problems relating to the geological positions and faunal relations of the California formations are still unsolved.

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The *laboratories* and *museums* of the department are well equipped for research, and new materials and apparatus are being added yearly. A collection of minerals comprising nearly 20,000 specimens is at the disposal of the student. The petrographical collections contain representatives of nearly all the rock types.

The collection of fossils in the departmental museum represents fully the development of invertebrate life, and as a working collection is excelled by few in America. Important collections of vertebrate fossils have been made by University expeditions to the John Day region of Oregon and to northern California. The material collected by the State Geological Survey, including the majority of Gabb's types, is in the collection, furnishing an almost complete set of species for comparison.

The activity in research during the past few years had led to the establishment of the BULLETIN OF THE DEPARTMENT OF GEOLOGY, of which fifty-three numbers have been issued.

Professor LAWSON conducts graduate work in inorganic geology, including discussions of special topics and advanced problems, critical reviews of current literature, prosecution of geological research, with a view to publication of results, methods of geological surveying and cartography, and petrographical studies.

Professor MERRIAM conducts advanced instruction and research in palaeontology. Particular attention is given to the investigation of problems in the palaeontologic geology of the west coast.

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MINERALOGY.

ANDREW C. LAWSON, Ph.D., Professor of Geology and Mineralogy.

ARTHUR S. EAKLE, Ph.D., Assistant Professor of Mineralogy.

HARRY O. WOOD, M.A., Instructor in Mineralogy and Geology.

A laboratory deposit of five dollars a year is required for Course 1, to cover cost of materials actually used and breakage of apparatus. Deposits are not required for other courses in this department.

LOWER DIVISION COURSES.

1. **Mineralogical Laboratory.**
Assistant Professor EAKLE and Mr. WOOD.

The course comprises two parts: (*a*) Practice in the determination of unlabeled minerals by means of their physical properties, the apparatus consisting of pen-knife, pocket lens, streak plate, and magnet. The object is to give the student sufficient familiarity with the most commonly occurring minerals of geological and economic importance to enable him to recognize or determine them in the field without delay. (*b*) The latter half of the course is devoted to the determination of minerals by blowpipe analysis.

6 hrs., throughout the year; two units each half-year. Four sections: M W F, 1-4; S, 9-12. Prerequisite: Matriculation Chemistry. Elective, College of Civil Engineering, with Mechanical Engineering 8 or Drawing 8A. Prescribed, Sophomore year, in the College of Mining, to the extent of 2 units each half-year.

UPPER DIVISION COURSES.

2A. **Crystallography.** (G.E.) Assistant Professor EAKLE.

The morphology of minerals.

2 hrs., first half-year. Tu Th, 11. Prerequisite: Junior standing. Prescribed, Junior year, in the College of Mining.

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2B. **Crystallographical Laboratory.** (G.E.)

Assistant Professor EAKLE.

2 hrs., first half-year; 1 unit. Tu, Th, 1-3. Concurrent with Course 2A, and open only to students who are taking that course.

2C. **Physical Properties of Minerals.** (G.E.)

Assistant Professor EAKLE.

Lectures.

1 hr., second half-year. Th, 10. Prerequisite: Course 2A. Prescribed, Junior year, in the College of Mining.

3. **Descriptive Mineralogy.** (G.E.)

Assistant Professor EAKLE.

A discussion of the salient properties and mode of occurrence of the more important minerals, with a classification of the same in natural groups; illustrated by typical specimens.

2 hrs., second half-year. Tu Th, 9. Prerequisite: Courses 1 and 2A. Prescribed, Junior year, in the College of Mining.

Petrography. See Courses 3 and 4 under Geology.

GRADUATE COURSES.

5. **Graduate Course.** Assistant Professor EAKLE.

Studies in the goniometrical investigation of crystals and in the determination of their physical constants. The acquiring of a wider and more thorough knowledge of minerals than is possible in the undergraduate course.

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MECHANICAL AND ELECTRICAL ENGINEERING.

CLARENCE L. CORY, M.M.E., Professor of Electrical Engineering.

FREDERICK G. HESSE, Professor of Hydraulics, Emeritus.

JOSEPH N. LECONTE, M.M.E., Assistant Professor of Mechanical Engineering.

HERMAN W. REYNOLDS, B.S., Assistant Professor of Mechanical Engineering.

GROVER C. NOBLE, B.S., Instructor in Electrical Engineering.

ARTHUR S. WHEELER, B.S., Assistant in Electrical Engineering.

JOHN F. BORDEN, M.E., Assistant in Mechanical Engineering.

GEORGE E. COX, Assistant in Mechanics and Foreman of Woodwork.

ALLEN C. WRIGHT, Assistant in Mechanics and Foreman of Iron Work.

ALEXANDER D. WHITE, Store Keeper and Machinist.

Laboratory deposits in this department are at the rate of five dollars a half-year for each laboratory or mechanical practice exercise a week. The average amount returned to the student at the end of the half-year is about two-fifths of the deposit.

2. **Hydrodynamics.** Assistant Professor LECONTE.

Investigation of the action of forces producing equilibrium or motion in liquids; pressure, stability, flow, etc., as affected by gravity, inertia, outer and inner friction. General theory and construction of hydraulic motors and pumping machinery.

3 hrs., first half-year. M W F, 9. Prerequisite: Physics 5. Prescribed, Senior year, in the Engineering Colleges.

3. **Hydraulic Machinery.** Assistant Professor LECONTE.

Discussion of such machines and apparatus as operate through the agency of fluids, either in modifying motion or transmitting power.

3 hrs., second half-year. M W F, 9. Prerequisite: Course 2. Prescribed, Senior year, in the College of Mechanics.

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4A. **Kinematics.** Assistant Professor LeConte.

Theoretical: Treatment of motion without reference to the cause which produces it, comprehending the study of pure mechanism, or the mutual dependence of the movements in the parts of a machine. *Applied:* Application of the preceding to the various kinematic problems connected with machine design and construction, such as link-motion, transmission by rolling and sliding contact, teeth of wheels, cams, form and proportions of the steam engine and other motors.

2 hrs., throughout the year. W F, 8. Prerequisite: Physics 5. Prescribed, Senior year, in the College of Mechanics.

4B. **Kinematics.** Assistant Professor LeConte.

Draughting and designing; to be taken only in connection with Course 4A.

3 hrs., second half-year; 1 unit. W, 1-4. Prescribed, Senior year, in the College of Mechanics.

5A. **Heat and Heat Engines.** Assistant Professor Reynolds.

Relations between heat and mechanical energy. Thermal properties of solids, liquids, and gases. Analysis of the cycles of steam, gas, oil, and air engines, and of refrigerating machinery, by means of pressure volume and temperature-entropy diagrams.

3 hrs., first half-year. M W F, 10. Prerequisite: Physics 5. Prescribed, Senior year, in the College of Mechanics.

5B. **Heat Engines: Design, Construction and Operation.** Assistant Professor Reynolds.

Fuels: heat-value and methods of producing combustion. Steam boilers, gas producers, carburetors. Design of reciprocating steam engines and internal combustion engines. Steam turbines. Discussion of the effects of compounding, jacketing and superheating. Air compressors and refrigerating machines. Design of power-plant equipment, including boilers, engines, condensers, pumps, fittings and connections. Foundations, chimneys, mechanical draft apparatus. Estimates of costs. Specifications and contracts.

3 hrs., second half-year. M W F, 10. Prerequisite: Physics 5. Prescribed, Senior year, in the College of Mechanics.

7A. **Mechanical Laboratory: Experimental Engineering.** Assistant Professor LeConte.

Experiments in hydraulics.

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3 hrs., throughout the year; 1 unit each half-year. Tu, 1-4. Prescribed, Senior year, in the Course in Mechanical Engineering, College of Mechanics.

7B. **Mechanical Laboratory: Experimental Engineering.**
Assistant Professor REYNOLDS and Mr. BORDEN.

Calibration of instruments, indicator springs, gauges, etc. Efficiency tests of simple steam engine, steam pump, injector, condenser, steam boiler, hot-air engine, gas engine. Valve-setting experiments. Quality of steam by separating, throttling and barrel calorimeters. Tests of strength of materials. Viscosity and flash tests of oils. Coal calorimetry. Flue-gas analysis. Tests of complete power plants.

3 hrs., throughout the year; 1 unit each half-year. Th, 1-4. Prescribed, Senior year, in the course in Mechanical Engineering, College of Mechanics.

8A. **Mechanical Practice.** Mr. COX.

Shop work in wood, including pattern-making.

6 hrs., first half-year; 2 units. Section I, M F, 1-4; II, Tu Th, 9-12; III, Tu Th, 1-4; IV, W, 1-4, and S, 8-11. Prescribed, Sophomore year, in the College of Mechanics.

8B. **Mechanical Practice.** Mr. COX.

Continuation of Course 8A.

6 hrs., second half-year; 2 units. Section I, M F, 1-4; II, Tu Th, 9-12; III, Tu Th, 1-4. Elective, Sophomore year, in the College of Mechanics.

9A. **Mechanical Practice.** Mr. WRIGHT.

Shop work in iron, including machine work.

6 hrs., first half-year; 2 units. Section I, M F, 1-4; II, Tu Th, 9-12; III, Tu Th, 1-4; IV, W, 1-4, and S, 8-11. Prerequisite: Course 8A or 8B. Prescribed, Junior year, in the College of Mechanics.

9B. **Mechanical Practice.** Mr. WRIGHT.

Continuation of Course 9A.

6 hrs., second half-year; 2 units. Section I, Tu Th, 9-12; II, Tu Th, 1-4; III, M F, 1-4. Elective Junior year, in the College of Mechanics.

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10A. **Electrical Machinery and Construction.** Mr. NOBLE.

Discussion of the construction and operation of electrical machinery, and its application to electric lighting and power distribution. The location and construction of electric lighting and power systems for cities, street railways, and mines.

2 hrs., throughout the year. Tu Th, 11. Prerequisite: Mathematics 3B and Physics 2A and 3. Prescribed, Junior year, in the College of Mechanics.

10B. **Electrical Machinery and Construction.** Mr. NOBLE.

Laboratory tests.

3 hrs., second half-year; 1 unit. This course cannot be taken except in conjunction with Course 10A. Prescribed, Junior year, in the College of Mechanics.

11A. **Alternating Currents and Alternating-Current Machinery.** Professor CORY.

The theory of the generation of single-phase and poly-phase alternating currents, the use of the complex quantity, and the calculation of the regulation and behavior of alternating-current apparatus and transmission lines.

4 hrs., first half-year. Tu Th, 9-11. Prescribed, Senior year, in the Course in Electrical Engineering, College of Mechanics. Prerequisite: Course 10A and 10B and Physics 5 and 7.

11B. **Alternating Currents and Alternating-Current Machinery.** Professor CORY.

The theory of the single-phase and poly-phase induction motor, synchronous motor and rotary converter, and their effects and operation in transmission systems.

4 hrs., second half-year. Tu Th, 9-11. Prerequisite: Course 10A and 10B and Physics 5 and 7. Prescribed, Senior year, in the Course in Electrical Engineering, College of Mechanics.

11C. **Alternating Currents and Alternating-Current Machinery: Laboratory.** Mr. WHEELER.

Practice in the laboratory, illustrating the work of the classroom.

6 hrs., throughout the year; 2 units each half-year. Section I, M Tu, 1-4; II, Th F, 1-4. Prerequisite: Courses 10A and 10B and Physics 5 and 7. Prescribed, Senior year, in the Course in Electrical Engineering, College of Mechanics.

14. **Thesis for B.S. Degree in Mechanics.**

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GRADUATE COURSES.

Graduate students who wish to engage in advanced work in hydraulics, thermodynamics, experimental engineering, electrical engineering, or related subjects, will be admitted to any of the courses offered, on giving evidence that they possess the fundamental knowledge which will enable them to do justice to the instruction offered. They will also be given all possible assistance outside the lecture room in the pursuit of advanced study and original investigation. A well equipped building is devoted to the work in these branches of engineering.

*12B. **Electrical Engineering Seminary.** Professor CORY.

Critical discussion of special electrical installations.

2 hrs., throughout the year.

12C. **Electrical Engineering: Laboratory.**

Professor CORY, Mr. NOBLE, and Mr. WHEELER.

Special tests and laboratory work.

Hours and credit value to be arranged.

13. **Hydraulics: Advanced Course.** Professor HESSE.

Discussion of special problems in hydraulics.

Hours and credit value to be arranged.

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*Not to be given in 1905-06.

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CIVIL ENGINEERING.

FRANK SOULÉ, Graduate U. S. Military Academy, Professor of Civil Engineering.

HERMANN SCHUSSLER, Honorary Professor of Water-Supply Engineering.

CHARLES DERLETH, Jr., C.E., Associate Professor of Structural Engineering.

EDWARD N. PROUTY, B.S., Assistant Professor of Railroad Engineering.

CHARLES G. HYDE, C.E., Assistant Professor of Sanitary Engineering.

LOREN E. HUNT, B.S., Lecturer in Civil Engineering.

CONRAD LORING, B.S., Instructor in Civil Engineering.

J. PAUL WILLIAMS, B.S., Instructor in Civil Engineering.

ELBERT A. GIBBS, Assistant in Civil Engineering.

Laboratory deposits are three dollars a half-year for each laboratory course, with the exception of Civil Engineering 8C, 3A, and 3B, in each of which the fee is ten dollars.

1A. **Surveying.** Assistant Professor PROUTY, Mr. WILLIAMS and Mr. GIBBS.

Theory of surveying; modern surveying instruments; methods employed in topographic, land, city, mining, and hydrographic surveys, and in making maps and calculations from field-notes. Full illustration by practical problems. Lectures and recitations.

2 hrs., throughout the year. Sections I, III, and V, M F, 8; II, IV, and VI, Tu Th, 8; VII and VIII, W S, 8. Prerequisite: Mathematics 3A. Prescribed, Freshman year, in the Engineering Colleges.

1B. **Field Practice and Mapping.** Assistant Professor PROUTY, Mr. LORING, and Mr. WILLIAMS.

The adjustment of surveying instruments in the field. Special problems in the field, illustrating the use of chain, level, transit, and plane-table; special problems in the draughting room, illustrating the methods of making maps from field notes.

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3 hrs., throughout the year; 1 unit each half-year. Section I, M, 1-4; II, Th, 1-4; III, Tu, 1-4; IV, W, 1-4. Open to students who have taken, or are taking, Course 1A. Prescribed, Freshman year, in the Engineering Colleges.

1C. **Topographical Signs.** Mr. LORING.

Conventional signs for topography with pen and brush.

3 hrs., second half-year; 1 unit. M, 9-12. Prescribed, Sophomore year, in the College of Civil Engineering. Prerequisite: Free-hand Drawing.

1D. **Titles and Lettering.** Mr. LORING.

Design and arrangement of titles for maps and other drawings.

3 hrs., throughout the year; 1 unit each half-year. Th, 9-12. Prescribed, Freshman year, in the College of Civil Engineering. Prerequisite: Free-hand Drawing.

UPPER DIVISION COURSES.

2A. **Railway, Highway, and Canal Surveying.**

Assistant Professor PROUTY.

Methods of making reconnaissance, preliminary, and location surveys for railways, highways, and canals; analytical and graphical calculations of earthwork, masonry, etc. Full illustration by practical problems. Lectures and recitations.

3 hrs., first half-year. Section I, M W F, 9; Section II, M W F, 10. Prerequisite: Courses 1A and 1B. Prescribed, Junior year, in the College of Civil Engineering, to students who elect Railroad or Sanitary Engineering.

2B. **Railroad Field Practice.**

Assistant Professor PROUTY and Mr. GIBBS.

The most simple parts of Railroad Surveying, such as running in curves, laying out sidings, etc.

6 hrs., first half-year; 2 units. Section I, M F, 1-4; Section II, Tu, Th, 1-4. Prescribed, Junior year, in the College of Civil Engineering, to students who elect Railroad or Sanitary Engineering.

2C. **Railroad Engineering Office Practice.**

Assistant Professor PROUTY.

The plotting of railroad maps and profiles; calculation of volumes in masonry and earthwork; determination of areas by planimeter; tracing of maps and plans; draughting of timber and masonry railroad structures from field-notes.

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3 hrs., second half-year; 1 unit. W, 1-4. Prescribed, Junior year, in the College of Civil Engineering, to students who elect Railroad Engineering. Prerequisite: Courses 2A and 2B.

3A. **Summer Class in Field Practice and Mapping.**
Assistant Professor PROUTY, Mr. LORING, Mr. WILLIAMS and Mr. EBRIGHT.

For four weeks immediately following Commencement, an extended survey of a suitable tract in the vicinity of Berkeley is made. A camp is established in the country, and work is carried on, as far as possible, just as in actual practice. Theoretical study is more fully illustrated by continuous field work than it can be during the regular university term. A general survey, illustrating methods of topographic, city, and mine surveying is made. All field notes are completely worked up in the office, and embodied in maps, computations, etc. 3 units credit.

Prerequisite: Courses 1A and 1B. Prescribed, at the end of the Freshman year, in the Colleges of Mining and Civil Engineering. No substitute for this course will be accepted.

3B. **Summer Class in Railroad Field Practice and Mapping.**
Assistant Professor PROUTY, Mr. LORING, and Mr. GIBBS.

Given concurrently with 3A. The survey of a railroad line, illustrating methods of making preliminary, location and construction surveys. All field notes are completely worked up in the office, and embodied in maps, computations, estimates, etc.

Prerequisite: Course 2A. Prescribed, at the end of the Junior year, in the College of Civil Engineering, to students who elect Railroad or Sanitary Engineering. No substitute for this course will be accepted.

4. **Railroad Economics.** Assistant Professor PROUTY.

Discussion of the theory of economic location and construction of railroads, based upon a study of operating expenses, rise and fall, distance, alignment, grades, etc.

3 hrs., second half-year. Tu Th, 9, and S, 8. Prerequisite: Course 2A. Prescribed, Junior year, in the College of Civil Engineering, to students who elect the course in Railroad Engineering.

5. **Higher Surveying.** Assistant Professor PROUTY.

Discussion of the figure of the earth, the measurement of base lines, and the methods of observing and making reductions

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in triangulation, of mapping of large areas, and of trigonometric and precise spirit leveling.

2 hrs., first half-year. Tu Th, 9. Prerequisite: Courses 1A and 1B; Mathematics 3B and 10; Astronomy 7 and either 4A or 4B. (Also open to students who take Astronomy 4A or 4B concurrently, and who have the other prerequisites.) Prescribed, Senior year, in the College of Civil Engineering, to students who elect the course in Railroad Engineering.

6. **Highways and Pavements.**

Assistant Professor PROUTY.

Principles underlying the construction and maintenance of country roads and city streets and pavements.

2 hrs., second half-year. W F, 10. Prescribed, Sophomore year, in the College of Civil Engineering, to students who elect the Railroad or Sanitary Engineering course.

7A. **Framed Structures.**

Associate Professor DERLETH and Mr. WILLIAMS.

The computation of stresses in roofs, building frames and simple bridge trusses, by analytical and by graphical methods; discussion of the different methods of loading bridges, and the more important details of construction. Fully illustrated by practical problems and designs.

3 hrs., second half-year. M W F, 10. Open to students who have taken, or who are taking, Course 8A, Physics 5 and Drawing 5. Prescribed, Junior year, in the College of Civil Engineering, to students who elect the courses in Railroad and Sanitary Engineering, and, Senior year, in the College of Civil Engineering, to students who elect the course in Irrigation Engineering.

7C. **Framed Structures.**

Associate Professor DERLETH and Mr. WILLIAMS.

Continuation of Course 7A. Theory for and the making of complete detailed designs of several structures, such as a plate girder, roof and bridge trusses, etc. Bridge shop practice.

3 units each half-year. Tu Th, 10; W, 1-4, throughout the year. Prerequisite: Course 7A. Prescribed, Senior year, in the College of Civil Engineering, to students who elect the course in Railroad, or in Sanitary Engineering.

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8A. **Strength of Materials.**

Professor SOULÉ and Associate Professor DERLETH.

Discussion of the elastic and the ultimate resistances of the materials used in construction; of the best methods in designing parts of structures, such as suspension rods, pillars, girders, and shafts; and of parts of uniform strength. Both analytical and graphical methods are used in demonstration. Lectures and problems.

2 hrs. first half-year, Tu Th, 9; and 3 hrs. second half-year, M W F, 9. Prerequisite: Satisfactory standing in the Differential and Integral Calculus (Mathematics 3B); and for the second half year in Physics 5. Prescribed, Junior year, in the Colleges of Mechanics, Mining, and Civil Engineering.

8B. **Civil Engineering Laboratory.** Mr. HUNT.

Supplementary to Course 8A. Machine tests of limes, cements, mortars, concretes, building-stones, etc.

3 hrs., second half-year; 1 unit. Section I, Tu, 1-4; II, Th, 1-4. Prerequisite: Course 8D. Prescribed, Junior year, in the College of Civil Engineering, to students who elect either Railroad or Sanitary Engineering.

8C. **Laboratory Course in Strength of Materials.** Mr. HUNT.

Supplementary to Course 8A. Laboratory machine tests of timber, metals, etc.

6 hrs., first half-year; 2 units. Laboratory, Tu Th, 1-4. Prerequisite: Course 8A. For Seniors and Graduates. Prescribed, Senior year, in the College of Civil Engineering, to students who elect the course in Railroad or Sanitary Engineering. The deposit in this course is ten dollars.

8D. **The Structural Metals.** Professor SOULÉ.

Pig iron, wrought iron, cast iron, steel, copper, etc.; their characteristics, properties, qualities necessary in construction, etc.

2 hrs., first half-year. Tu Th, 9. Prerequisite: Junior standing in any one of the engineering colleges. Prescribed, Junior year, in the College of Civil Engineering.

*8E. **Problems in Strength of Materials.** Professor SOULÉ.

Practical application of the principles of Course 8A.

2 hrs., second half-year; 1 unit. Open to those taking Course 8A.

*Not to be given in 1905-06.

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8F. **Higher Course in Strength of Materials.** Professor SOULÉ.

Lectures on resilience, impact on materials, centrifugal stress, etc.

2 hrs., second half-year. Tu Th, 8. Prerequisite: Course 8A. Prescribed, Senior year, in the College of Civil Engineering, to students who elect the course in Railroad Engineering.

9. **Drainage and Sewerage Engineering.**

Assistant Professor HYDE.

Sanitary drainage of houses and lands, and proper design and construction of sewerage works. Lectures, recitations, and problems.

2 hrs., first half-year. Tu Th, 11. Prescribed, Senior year, in the College of Civil Engineering, in the course in Sanitary Engineering. Prerequisite: Course 11A.

9B. **Sewage and Garbage Disposal.** Assistant Professor HYDE.

Study of the character of sewage; and of the principles underlying its purification; of the collection and disposal of garbage; and of the street-cleaning problem.

1 hr., first half-year. Prescribed, Senior year, in Civil Engineering and in Sanitary Engineering, concurrent with Course 9A.

11A. **Water Supply Engineering.** Assistant Professor HYDE.

Lectures, recitations, and problems dealing with the underlying principles and the design of works for the collection, storage, and distribution of water for public and domestic use.

2 hrs., second half-year. Tu Th, 11. Prescribed, Junior year, in the course in Sanitary Engineering, College of Civil Engineering.

11B. **Potability of Water, and Water Purification.**

Assistant Professor HYDE.

A study of the sanitary qualities of waters; discussion of suitable methods for their purification.

1 hr., second half-year. M, 1. Prescribed, Junior year, in the Course in Sanitary Engineering, College of Civil Engineering.

12A. **Dams of Timber, Stone, or Earth.** Professor SOULÉ.

3 hrs., first half-year. M W F, 8. Prescribed, Senior year, to students who elect the courses in Sanitary and Irrigation Engineering, in the College of Civil Engineering.

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13. **Foundations of Structures.** Professor SOULÉ.

Foundations on land, under water, or in the sea.

2 hrs., second half-year; 2 units. Tu Th, 11. Prerequisite: Course 8A. Prescribed, Senior year, in the College of Civil Engineering.

17. **Stone, Masonry, Cements, etc.** Professor SOULÉ.

Lectures and recitations.

3 hrs., second half-year. M W, 1; S, 9. Prerequisite: Sophomore standing in Engineering Colleges. Prescribed, Sophomore year, in the College of Civil Engineering.

19. **Thesis for B.S. Degree in Civil Engineering.**

The candidate must register for this work during both half-years of his last or Senior year. The subject of the thesis will be chosen by the candidate, with the approval of the Dean of the College of Civil Engineering and the instructor or adviser who would have immediate direction of the work proposed. The thesis subjects of students expecting to be graduated in May must be selected and approved on or before the third Monday of the preceding September. The corresponding date for December graduates is the third Monday of the preceding February.

A circular of detailed instructions governing thesis work is distributed to all interested students at the office of the Dean of the College of Civil Engineering, 17 MCE Building. Seniors must apply to the Dean for a copy of this circular at the time of their first registration for thesis work.

GRADUATE COURSES.

*11C. **Retaining Walls.** Professor SOULÉ.

2 hrs., second half-year. Open to students who have completed Course 8A. Offered for 1904-05, 1906-07, etc. S, 10-12.

*12B. **Stone Arches and Bridges.** Professor SOULÉ.

Theory of the stone arch; the designing and construction of bridges of stone.

2 hrs., second half-year; 2 units. M F, 10. For Seniors and Graduates in the College of Civil Engineering. Open to students who have completed Course 8A, and who are taking or have completed Course 13. Offered for 1902-03, 1904-05, 1906-07, etc.

*Not to be given in 1905-06.

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14. **Framed Structures.** Associate Professor DERLETH.

Continuation of Course 7C, including such subjects as continuous beams and girders, and swing, suspension, cantilever, and metallic arch bridges. More advanced work in designing and detailing framed structures.

9 hrs., throughout the year; 3 units each half-year. First half-year, M W F, 10; second half-year, M W F, 9. Prerequisite: Course 7C. Graduate students may devote additional time to this course upon approval of the Dean of the College of Civil Engineering.

*15. **Laboratory Experiments.** Mr. HUNT.

Experiments upon, and investigation concerning, the materials used in engineering construction. Practical tests of the "theories of flexure." Tests of full-sized columns, girders, etc.

2 hrs., first half-year; 1 unit. Prerequisite: Courses 8A, 8B, 8C, and 8D.

16. **Specifications and Contracts.** Professor SOULÉ.

Laws and forms of specifications and contracts in engineering operations. Lectures.

2 hrs., first half-year; 2 units. Prerequisite: Graduation from the College of Civil Engineering.

18. **Electric Railway Construction and Operation.**
Assistant Professor PROUTY.

Lectures and Seminary work.

2 hrs., second half-year.

20. **Concrete—Steel Structures.** Associate Professor DERLETH.

Throughout the year. Programme of work to be arranged in each case. Prerequisite: Course 7C.

21. **Theory of Least Work and Deflections.** . .
Associate Professor DERLETH.

Applications to statically indeterminate structures.

Throughout the year. Programme of work to be arranged in each case. Prerequisite: Course 7C.

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*Not to be given in 1905-06.

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22. **Sanitary Designing.** Assistant Professor HYDE.

Practical illustrations of the features of the designs of systems, or portions of systems of works for water supply, water purification, sewerage, sewage and garbage disposal, etc. Typical problems and designs. Throughout the year.

Individual assignments. Prerequisite: Courses 9A, 9B, 11A, and 11B.

23. **Municipal Sanitation, Sanitary Science, and the Public Health.** Assistant Professor HYDE.

Outline of most recent developments of knowledge concerning the relation of Sanitary Science to the public health; the sanitary aspect of water, milk, ice, and food supplies; disinfection, and organization of Boards of Health.

Prerequisite: Courses 9A and 9B, 11A and 11B.

For advanced work in Civil Engineering the laboratory has recently been furnished with a large selection of apparatus specially provided to make tests and original experiments upon the materials used in engineering construction.

Every facility will be offered to students of engineering desiring to do advanced work in making use of this apparatus to prosecute, under the direction of the department, any duly approved original and independent investigations.

COURSES IN OTHER DEPARTMENTS.

Analytic Mechanics.

See Physics 5.

Hydrodynamics.

See Mechanics 2.

Graphostatics.

See Drawing 5.

Astronomy.

See Astronomy 4B.

Irrigation.

See Irrigation 1, 2, 2A, and 3.

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IRRIGATION.

ELWOOD MEAD, D.Eng., Professor of the Institutions and Practice of Irrigation.

Courses 1, 2, 2A, and 3 are designed to meet the needs of engineering and agricultural students who wish to make a specialty of irrigation. They appear as part of the course of Irrigation Engineering in the College of Civil Engineering. They are also elective in the other Colleges of Engineering and in the College of Agriculture. Course 1 is open to students in Economics.

Students of the Agricultural Department desiring to take these courses would do well to include Civil Engineering 1A, 1B, and 1C in their elective work for the first two years.

UPPER DIVISION COURSES.

1. **Irrigation Institutions and Economics.** Professor MEAD.

Present conditions of irrigation in the United States; irrigation legislation; methods of establishing rights to water; interstate problems; conditions necessary to development of the agricultural resources of the arid west; comparisons of irrigation methods and laws of other lands with those of the United States; irrigation in humid sections of the United States; operation of irrigation works, individual, coöperative and corporate enterprises; national irrigation; water right contracts; duty of water. Lectures and recitations.

3 hrs., second half-year. M, 8; Tu Th, 9. Prescribed, Senior year, in the course in Irrigation Engineering, College of Civil Engineering, and in some courses in the College of Agriculture. Elective to students in Economics.

2. **The Diversion, Conveyance, and Application of Water.**

Properties of water; units of measurement; flow of water through orifices, over weirs and in open and closed channels; gauging laterals, canals, and streams by means of floats, current meters, weirs, modules; irrigation works classified: diversion weirs and headgates; alignment, slope and cross-section of canals; suitable grades for required velocities; construction and maintenance of canals; flumes and pipes

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for irrigation, their construction and use; methods of applying water to land; duty of water. Full illustrations by lectures and practical problems.

3 hrs., first half-year. Tu Th S, 10. Prescribed, Junior year, in the course in Irrigation Engineering; elective in College of Civil Engineering and in College of Agriculture.

2A. **Irrigation Design.**

The design of irrigation structures, such as headgates, flumes, and drops. Preparation of detailed estimates of cost of such structures.

3 hrs., throughout the year. Prescribed, Junior year, in the course in Irrigation Engineering; elective in College of Civil Engineering and in College of Agriculture.

3. **The Conservation of the Water Supplies.**

Sources of water supply; precipitation, run-off and fluctuation in stream-flow; loss of water by evaporation and seepage; return waters; removal of surplus and seepage waters; reclamation of alkali lands by means of drainage; storage of water in natural lakes and artificial reservoirs; utilization of subterranean sources of supply by means of pumps, drains, tunnels; conservation of soil moisture; influence of forests on water supply.

2 hrs., second half-year. Tu Th, 10. Prescribed, Junior year, in the Course in Irrigation Engineering; elective in other Courses of Engineering and in the College of Agriculture.

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MINING AND METALLURGY.

SAMUEL B. CHRISTY, Ph.B., Sc.D., Professor of Mining and Metallurgy.

ERNEST A. HERSAM, B.S., Associate Professor of Metallurgy.

CURTIS H. LINDLEY, Honorory Professor of the Law of Mines and Water.

WALTER S. MORLEY, B.S., Instructor in Assaying and Mill Assistant.

CHARLES T. DOZIER, B.S., Assistant in Assaying.

GEORGE SPENCER, Mechanician.

EDWIN B. WILLOUGHBY, Helper in Mining Laboratory.

The lecture courses described below are fully illustrated by lantern-slides, showing methods used in all the principal mining fields. The laboratory courses are designed to illustrate and supplement the lecture courses.

Laboratory deposits are twenty-five dollars a half-year for laboratory courses 7A, 7B, 9, 10, and 13. The amount returned to the student at the end of the half-year, after deducting for cost of materials actually used and for breakage of apparatus, is usually five or ten dollars.

1. **Lectures on Mining.** Professor CHRISTY.

Ores: their nature, occurrence, and relation to mining laws. Location of claims, methods of prospecting, excavating, tunneling, shaft-sinking, and timbering.

4 hrs., first half-year. M Tu Th F, 9. Prerequisite: Senior standing in the College of Mining. Prescribed, Senior year, to students in the College of Mining.

2. **Lectures on Mining.** Professor CHRISTY.

Winning, exploration, and exploitation. Methods of transportation and hoisting; of drainage, ventilation, and lighting; of general organization and administration.

4 hrs., second half-year. M Tu Th F, 9. Prerequisite: Course 1. Prescribed, Senior year, to students in the College of Mining.

3. **Mining Laboratory.**

Professor CHRISTY, Mr. MORLEY, and Mr. WILLOUGHBY.

Lectures and laboratory practice in sharpening, hardening, and tempering hand and machine drills; the use of single and double hand drills, and of machine drills; explosives and the theory and practice of placing, charging, and firing of blasts.

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6 hrs. laboratory and 2 hrs. lecture, second half-year; 2 units. 2 hrs. lecture, Tu Th, 10; laboratory, W, 1-4, and S, 9-12. Prescribed, Junior year, to students in the College of Mining.

4. **Summer Class in Practical Mining.** (Senior Conference.)

Professor CHRISTY.

During the vacation at the end of the Junior year, all mining students will be required to spend at least four weeks in the systematic study of practical mining, taking notes and making sketches of processes observed. This is the minimum requirement. It is recommended that all free vacation time throughout the four years be devoted to actual work underground at the various branches of practical mining. Details in every case must be arranged in consultation with Professor Christy. A full report on this work must be presented and read before the Juniors and Seniors at the mining conference during the Senior year. This conference will be held weekly. W, 9.

5. **Metallurgy: Structural Metals and Fuels.**

Professor CHRISTY.

The classification of ores: methods and appliances for their reduction, and their bearing on the physical properties of the structural metals. Fuels, and their relative value as heat-producers.

2 hrs., first half-year. M F, 10. Prerequisite: Chemistry 1 and 3; Physics 1, 2A, and 3. Prescribed, Junior year, in the College of Mining. Elective, Junior year, in the College of Mechanics.

6. **Metallurgy: Ore Crushing, Sampling, Fluxes.**

Associate Professor HERSAM.

Methods of crushing ores; of sampling ores and their products; fluxes, refractory materials, and metallurgical products.

2 hrs., second half-year. M W, 8. Prerequisite: Mining 5, Chemistry 1 to 6, Physics 1 to 3, and Mineralogy 1. Prescribed, Junior year, in the College of Mining. Required of students who elect Courses 7A, 7B, 8, 9, 10, 11, and 13.

7A. **Assaying.** Mr. MORLEY.

Lectures and laboratory practice. The proper use and care of the assay balance. Cupellation of gold and silver. Parting of gold and silver. Preparation of the sample. Scorification assays of gold and silver ores. Crucible method for these ores.

6 hrs., first half-year; 2 units. Section I, M, Tu, 1-4; II, W Th, 1-4; III, F, 1-4, and S, 9-12. Conference for all sections, W,

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9-11. Prerequisite: Chemistry 1 to 6, inclusive; Mineralogy 1; Mining 5 and 6. Prescribed, Junior year, in the College of Mining.

7B. **Assaying.** Mr. MORLEY.

Lectures and laboratory practice. Fire assays of ores of lead, antimony, tin, nickel, cobalt, copper, iron.

6 hrs., second half-year; 2 units. Section I, M Tu, 1-4; II, Th F, 1-4. Conference for both sections (when necessary), W, 9. Prerequisite: Course 7A. Prescribed, Junior year, in the College of Mining.

8. **Metallurgy of Gold, Silver and Quicksilver.**

Professor CHRISTY.

Lectures on the amalgamation of gold and silver; processes for leaching silver ores; chlorination and cyanide processes with gold ores; quicksilver reduction and condensation.

2 hrs., first half-year. Tu Th, 10. Prerequisite: Courses 5, 6, 7. Prescribed, Senior year, in the College of Mining.

9. **Metallurgical Laboratory: Mill Work.**

Associate Professor HERSAM.

Supplementary to Course 8. Prerequisite: Course 8.

Experiments on a working scale in crushing, sampling, concentrating, roasting, leaching, and amalgamating gold and silver ores.

6 hrs., first half-year; 2 units. Section I, M Tu, 1-4; II, Th F, 1-4. Prescribed, Senior year, in the College of Mining. Prerequisite: Courses 5, 6, 7A, 7B, and 8.

10. **Metallurgical Laboratory: Mill Work.**

Professor CHRISTY and Associate Professor HERSAM.

Supplementary to Course 8.

The investigation of special problems in the treatment of ores, particularly of the precious metals. An introduction to research work. Such Seniors only as take this course will be allowed to elect a thesis in metallurgy.

6 hrs., second half-year; 2 units. Section I, M Tu, 1-4; II, Th F, 1-4. Elective, Senior year, in the College of Mining. Prerequisite: Courses 5, 6, 7, 8, and 9.

11. **Metallurgy of Lead and Copper.**

Associate Professor HERSAM.

Methods of smelting lead and copper ores, with particular reference to their gold and silver content.

2 hrs., second half-year. M F, 8. Prerequisite: Courses 5, 6, 7, 8. Prescribed, Senior year, in the College of Mining.

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17. **Thesis for B.S. Degree in Mining.**

GRADUATE COURSES.

The above courses, given as undergraduate courses, are open to graduate students whose previous preparation in Science and Engineering has fitted them to undertake the work.

These courses provide fourteen units of work per week during the first half-year, and twelve units per week during the second half-year, and include both lecture and laboratory work.

The attention of those who wish to prepare themselves for the mining and metallurgy of the precious metals is directed to these courses. The libraries, laboratories, and museums of the University have been carefully designed to meet the needs of such students, and it is confidently believed that opportunities are offered for the study of the mining and metallurgy of the precious metals which are not met with elsewhere.

12. **Ore Dressing.** Professor CHRISTY.

Theory of ore separation: discussion of the leading methods in use for separating coarsely and finely disseminated minerals, with particular reference to the treatment of gold and silver ores, and also those of copper, lead, zinc, iron, and tin.

2 hrs., second half-year. Tu Th, 10. Open to properly qualified Seniors in the College of Mining.

13. **Special Investigations in Treatment of Gold and Silver Ores.** Professor CHRISTY.

Prerequisite: Courses 5, 6, 7A, 7B, 8, 9, 10, 11, 12.

14. **Mining Law of the United States.** Professor LINDLEY.

Open to Seniors in the College of Mining.

A course of 12 lectures given first half-year.

15. **Engineering Law.** Professor LINDLEY.

Lectures adapted to the needs of mining students.

Second half-year. Details to be announced later.

16. **Metallurgy of Iron and Steel.** Associate Professor HERSAM.

The ores of iron and the methods for their reduction. The production of pig-iron, wrought-iron, and the various grades of steel. The physical properties of structural iron and steel as related to chemical composition and metallurgical treatment.

Primarily for Graduates. Prerequisite: At least Senior standing in the College of Mining. 2 units. First half-year. Hours to be arranged later.

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DRAWING.

HERMANN KOWER, C.E., Assistant Professor of Drawing.

C. CHAPEL JUDSON, Instructor in Free-hand Drawing.

WILLSON J. WYTHE, B.S., Instructor in Drawing.

FREDERICK W. H. MEYER, Instructor in Drawing.

HERMAN W. REYNOLDS, B.S., Assistant Professor of Mechanical Engineering.

JOHN F. BORDEN, M.E., Assistant in Mechanical Engineering.

LOWER DIVISION COURSES.

A. **Elementary Free-hand Drawing.** Mr. JUDSON.

Drawing in pencil from models, embracing the study of light and shade and perspective; with lectures.

3 hrs., throughout the year; 1 unit each half-year. Section I, W, 1-4; II, Tu, 1-4; III, Tu, 9-12; IV, F, 1-4. Prescribed, Freshman year, in the Engineering Colleges. This course is intended as an equivalent for Matriculation Subject 16.

B. **Instrumental Drawing.** Mr. WYTHE and Mr. MEYER.

Instrumental drawing, solving of geometrical problems, construction of mathematical curves, lettering.

6 hrs., first half-year; 2 units. Sections I and II, Tu Th, 1-4; III, M F, 1-4; IV, W, 1-4, and S, 9-12; V, VI, Tu Th, 9-12. Prescribed, Freshman year, in the Engineering Colleges. This course is intended as an equivalent for Matriculation Subject 17.

2A. **Descriptive Geometry.**

Assistant Professor KOWER, Mr. WYTHE, and Mr. MEYER.

Fundamental problems on point, line, plane; sections; intersections.

6 hrs., first half-year. M F, 1-4. For students in Engineering Colleges who enter with credit for Matriculation Subject 17. Assistant Professor Kower.

6 hrs., second half-year; 2 units. Section I, Tu Th, 1-4; II, M F, 1-4; III, W, 1-4, and S, 9-12; IV, Tu Th, 9-12. Prescribed, Freshman year, in the Engineering Colleges. Prerequisite: Course 1.

2B. **Descriptive Geometry.**

Assistant Professor KOWER and Mr. WYTHE.

Shades and shadows, perspective, isometric projection.

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6 hrs., first half-year; 2 units. Section I, Tu Th, 9-12; II, Tu Th, 1-4; III, Tu Th, 1-4. Prescribed, Sophomore year, in the Colleges of Mechanics and Civil Engineering. Prerequisite: Course 2A.

3. **Mechanical Drawing.** Mr. BORDEN.

Elementary machine design. Work at the drawing board, supplemented by lectures upon the principles underlying the design of elements of machines.

6 hrs., second half-year; 2 units. Tu Th, 1-4. Prescribed, Sophomore year, in the College of Mechanics.

9. **Free-hand Lettering and Round Writing.**
Mr. WYTHE and Mr. MEYER.

3 hrs., second half-year; 1 unit. Open to students in Drawing.

10. **Stereotomy.** Assistant Professor KOWER.

Continuation of Course 2B, intended for students of Architecture.

6 hrs., second half-year; 2 units.

UPPER DIVISION COURSES.

4. **Mechanical Drawing.** Assistant Professor REYNOLDS.

Continuation of Course 3. Design of fire-tube and water-tube boilers; steam engines and accessories, and typical machines suitable for illustrating the general principles of engineering design.

6 hrs., second half-year; 2 units. M F, 1-4. Prescribed, Junior year, in the College of Mechanics.

5. **Graphostatics.** Assistant Professor KOWER and Mr. WYTHE.

Graphical analysis of stresses in Engineering structures.

2 hrs., second half-year. Section I, M, 2-4; II, W, 2-4; III, F, 2-4. Prescribed, Junior year, in the Colleges of Mechanics, Mining, and Civil Engineering.

7. **Construction.** Assistant Professor KOWER.

This course is a continuation of Course 5, and includes the designing of engineering structures, such as roof-trusses, bridges, etc.

6 hrs., throughout the year; 2 units each half-year. M F, 1-4. Prescribed, Senior year, in the College of Mechanics, except to those who take the course in Electrical Engineering.

14. **Advanced Work in Free-hand Drawing.** Mr. JUDSON.

6 hrs., throughout the year. W F, 9-12.

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ARCHITECTURE.

JOHN GALEN HOWARD, Professor of Architecture.

UPPER DIVISION COURSES.

1. **Elements of Architecture.**

Drawing of the Classic Orders and their application.

12 hrs., throughout the year; 4 units each half-year. Prerequisite: Drawing A, B, 2A and 2B.

2. **Planning.** Professor HOWARD.

Fundamental problems in planning.

18 hrs., first half-year, 6 units; 21 hrs., second half-year, 7 units. Prerequisite: Course 1.

*5A. **History of Ancient and Classic Architecture.**

A general survey of the history of ancient and classic Architecture.

2 hrs., first half-year; 2 units. 1 hr., second half-year; 1 unit.

*5B. **History of Mediaeval and Renaissance Architecture.**

2 hrs., throughout the year; 2 units each half-year.

6A. **Theory of Architecture.**

1 hr., throughout the year; 1 unit each half-year.

6B. **Theory of Architecture.** (Continuation of Course 6A.)

1 hr., throughout the year; 1 unit each half-year.

11. **Sanitary Science.**

2 hrs., first half-year; 2 units.

12. **Water Color.**

1 hr., throughout the year; 1 unit each half-year.

13. **Pen and Ink.**

1 hr., throughout the year; 1 unit each half-year.

*The full course in History of Architecture and Allied Arts (5A, 5B, 5C, and 5D) is covered in four years, the courses being given in succession, one each year.

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14. Modeling.

1 hr., throughout the year; 1 unit each half-year.

GRADUATE COURSES.

3. Planning and Composition. Professor HOWARD.

30 hrs., throughout the year; 10 units each half-year. Prerequisite: Course 2.

4. Advanced Design. Professor HOWARD.

30 hrs., first half-year; 10 units. Prerequisite: Course 3.

***5C. History of Modern Architecture.**

2 hrs., first half-year; 2 units.

***5D. History of Allied Arts.**

2 hrs., second half-year; 2 units.

6C. **Theory of Architecture.** (Continuation of Course 6B.)

1 hr., throughout the year; 1 unit each half-year.

7. Steel Construction and Fireproofing.

2 hrs., first half-year; 2 units.

8. Architectural Construction.

2 hrs., second half-year; 2 units.

9. Specifications and Working Drawings.

3 hrs., first half-year; 3 units.

10. Business Relations.

2 hrs., first half-year; 2 units.

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*The full course in History of Architecture and Allied Arts (5A, 5B, 5C, and 5D) is covered in four years, the courses being given in succession, one each year.

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AGRICULTURE, HORTICULTURE, AND ENTOMOLOGY.

*EUGENE W. HILGARD, Ph.D., LL.D., Professor of Agriculture and Agricultural Chemistry; Director of Agricultural Experiment Station.

EDWARD J. WICKSON, M.A., Professor of Agricultural Practice and Superintendent of University Extension in Agriculture.

CHARLES W. WOODWORTH, M.S., Associate Professor of Entomology.

ROBERT H. LOUGHRIDGE, Ph.D., Assistant Professor of Agricultural Geology and Agricultural Chemistry.

MYER E. JAFFA, M.S., Assistant Professor of Agriculture; in charge of Laboratory of Agricultural Chemistry.

GEORGE W. SHAW, M.A., Ph.D., Assistant Professor of Agricultural Technology.

RALPH E. SMITH, B.S., Assistant Professor of Plant Pathology.

GEORGE E. COLBY, M.S., Assistant Professor of Agricultural Chemistry.

ARNOLD V. STUBENRAUCH, M.S.A., Assistant Professor of Horticulture, in charge of Sub-stations.

ERNEST W. MAJOR, B.Agr., Assistant Professor of Animal Industries.

FREDERIC T. BIOLETTI, M.S., Assistant Professor of Viticulture.

EDMUND H. TWIGHT, B. ès Sc., Graduate of Ecole Nationale d'Agriculture de Montpellier, Lecturer in Zymology and Enology.

CLARENCE M. HARING, D.V.M., Instructor in Veterinary Science and Bacteriology.

CHARLES A. COLMORE, B.S., Clerk to Director.

ROBERT E. MANSELL, Gardener to the College of Agriculture.

The officers whose names follow are engaged primarily in short-course and University Extension work.

WARREN T. CLARKE, B.S., Assistant Superintendent of Farmers' Institutes.

DOUGLAS T. FOWLER, M.A., Conductor of Farmers' Institutes north of the Tehachipi.

EMIL H. HAGEMANN, Assistant in Cheese-Making (October, November, December).

WALLACE M. STEVENSON, M.S., Assistant in Butter-Making (October, November, December).

* Absent on leave, 1905-06.

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Courses 1A, 1B, 4A, and 4B are prescribed in the College of Agriculture in the old curriculum; all the courses are elective in the revised curriculum. Attention is called to the fact that the prescribed technical work of the old curriculum (Courses 1 to 4 in Chemistry, 1 and 2 in Botany, and 1A, 1B, 4A, 4B in Agriculture) includes only that which is required of all students graduating under that schedule in the College of Agriculture; in addition to these there must be elected some special lines of study in Agricultural Chemistry, Practical Agriculture, Horticulture, Irrigation, Viticulture, Botany, Entomology, etc. These studies should be taken in groups corresponding to different professional lines, viz.: Practical Agriculture and Horticulture; Agricultural Engineering and Irrigation; Agricultural Chemistry, Physics, and Geology, Agricultural Biology (Zoology, Entomology, Botany); Agricultural Technology (sugars, starch, bread, fats, canning, etc.), as has been provided in the new technical course. For each of these lines, courses will be laid out by the corresponding instructors.

Laboratory deposits are fifteen dollars a half-year for each chemical laboratory course.

Courses 1A, 7A, 7B, 7C, 7D, *and* 8 *may be taken by students in the Colleges of General Culture as part of the prescribed work in Natural Sciences in those Colleges.*

LOWER DIVISION COURSES.

AGRICULTURE, HORTICULTURE AND VITICULTURE.

4C. **Landscape Gardening.** Assistant Professor STUBENRAUCH.

The principles of ornamental and landscape gardening, with special reference to the beautifying of home grounds. Lectures, illustrated by means of lantern slides and charts.

1 hr., first half-year. M, 10.

4E. **Plant Propagation.** Assistant Professor STUBENRAUCH.

A study of the methods of securing and perpetuating desirable varieties of plants,—grafting, budding, layering, making cuttings, pollination, seedage, etc. Lectures, text-book, and practical exercises.

1 hr. lecture, 2 hrs. practical exercises, first half-year. S, 9-12.

13. **Agricultural Literature.** Professor WICKSON and others.

An elementary course designed for the study of current agricultural literature, especially the publications of the Agricultural Experiment Stations of the several States.

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1 hr., either half-year. Tu, 10. May be repeated indefinitely without duplication of work. Open to students in the College of Agriculture. Regular students are advised to begin the course in the Freshman year.

14. **University Extension in Agriculture.**

Professor WICKSON and others.

Study and discussion of policies, methods, and practices of university extension in agricultural lines, as pursued by State Universities and Colleges of Agriculture.

1 hr., either half-year. Th, 10. May be repeated indefinitely without duplication of work. Open to students in the College of Agriculture.

PLANT PATHOLOGY.

Students intending to take advanced or special work in plant diseases should lay a thorough foundation in the allied subjects, particularly in Botany, and in Chemistry, Physics, Bacteriology, Entomology, Agricultural Practice, and Modern Languages. The growing demand for specialists in this line, both in California and elsewhere, may be expected to lead to increased facilities for instruction and specialization in the investigation of phyto-pathological problems. The natural opportunities afforded for such training in California may fairly be said to surpass those of almost any other region.

9. **General Plant Pathology.** Assistant Professor SMITH.

Lectures, illustrated by specimens, charts, photographs, and field observations, on the general relation of economic plants to conditions which affect their health, vigor, and productiveness.

2 hrs., second half-year. Tu Th, 9.

ENTOMOLOGY.

Students in the Lower Division desiring to take work in Entomology should confer with the instructor before registering in these courses, since the classes will be strictly limited to the seating capacity of the lecture room.

8. **Laboratory Methods.**

Associate Professor WOODWORTH and Mr. ———.

A series of practical exercises, designed to acquaint the student with the commoner methods of studying insects; including the methods of collecting, mounting, and breeding insects; the use of the microscope, the microtome, and the simpler

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physiological apparatus; the camera lucida and lantern enlargements, and other micrographic methods.

3-9 hrs., 1 to 3 units, either half-year. M Tu W Th F, 8-4; S, 8-12.

7A. **General Entomology.** Mr. ———.

A general review of the structure, habits and classification of insects.

2 hrs., first half-year. Tu Th, 9.

7B. **Economic Entomology.** Associate Professor WOODWORTH.

Detailed studies of a series of the most injurious insects.

2 hrs., first half-year. Tu Th, 11.

9C. **Spraying.** Mr. CLARKE.

A study of the methods of spraying plants for the control of insect pests and fungous diseases. Lectures and practical exercises.

2 hrs., second half-year. S, 10-12.

7C. **Ecology.** Associate Professor WOODWORTH.

A discussion of the relation of insects to their environment.

2 hrs., second half-year. Tu Th, 9.

7D. **Apiculture.** Associate Professor WOODWORTH.

The structure and habits of bees, and their management for the production of honey.

1 hr., second half-year. S, 9.

UPPER DIVISION COURSES.

AGRICULTURAL CHEMISTRY AND SOIL PHYSICS.

1A. **General Course.** Assistant Professor SHAW.

Chemistry of plants and their products, with reference to their uses. Inorganic ingredients of plants; ash analysis. Physics and nutrition of plants.

3 hrs., first half-year. Tu Th S, 11.

1B. **Chemistry and Physics of Soils.**

Professor HILGARD and Assistant Professor LOUGHRIDGE.

Origin, formation, and classification of soils. Physical properties and mechanical analysis; chemical composition. Soil analysis—its methods, utility, and interpretation. Policy of culture; exhaustion of soils and their fertilization and

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restoration; drainage, irrigation, soils of the arid and humid regions; soil regions of the Pacific coast.

3 hrs., second half-year. Tu Th S, 11. Prerequisite: Botany 1 and 2; Chemistry 1, 2, 3, and 4.

1D. **The Physics and Geology of Soils.**

Assistant Professor LOUGHRIDGE.

2 hrs. lecture, 2 units; or, with 3 hrs. laboratory work, 3 units, first half-year. M W, 11.

1E. **Laboratory of Agricultural Chemistry.**

Assistant Professors JAFFA and COLBY.

Desk room is provided for twenty-five advanced and special students, for instruction in the analysis of soils, waters, fertilizers, and agricultural products.

12 or 15 hrs., throughout the year, or half-year (as the student may elect); 4 or 5 units, each half-year. M Tu W Th F, 1-4, and S, 9-12. Prerequisite: Chemistry 3 and 5A.

AGRICULTURE, HORTICULTURE AND VITICULTURE.

4A. **Agriculture.** Professor WICKSON.

Field cultures of grains, vegetables and forage plants.

3 hrs., first half-year. M W F, 9.

4B. **Horticulture.** Professor WICKSON.

Principles and practice of fruit growing in semi-tropical countries, with special reference to California conditions and methods.

3 hrs., second half-year. M W F, 9.

4D. **Chemistry of Fruits.** Assistant Professor COLBY.

Chemical composition of fruits, and its relations to orchard soils, fertilizers, irrigation water, etc.

1 hr. lecture, second half-year; W.

5D. **Viticulture.** Assistant Professor BIOLETTI.

A general course in the methods of establishing and maintaining a vineyard, with special reference to conditions existing in California. (*a*) Ampelography. (*b*) Cultivation of the vine. (*c*) Handling of the product of the vine. (*d*) Laboratory.

2 hrs. lectures and 3 hrs. laboratory, throughout the year; 3 units each half-year. Tu Th, 8.

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AGRICULTURAL INDUSTRIES.

2. **Enology.** Mr. TWIGHT.

A special course in vinification and the manufacture of grape products, including unfermented grape juice, sparkling wines, etc.

2 hrs., throughout the year. M W, 1.

2A. **Analysis of Must and Wine.** Assistant Professor COLBY.

1 hr. lecture, 6 hrs. laboratory work; 3 units, first half-year. Lecture, Tu, 1; laboratory, Tu Th, 9-12.

2B. **Adulterations of Fermented and Distilled Liquors.** Assistant Professor COLBY.

1 hr. lecture, 6 hrs. laboratory work; 3 units, second half-year. Lecture, Tu, 1; laboratory, Tu Th, 9-12.

It is essential that students entering Courses 2, 2A, and 2B should have some knowledge of elementary chemistry; and previous experience in wine-making will be of material advantage.

2D. **Zymology.** Mr. TWIGHT.

Lectures (once a week) on the micro-organisms of fermentation, especially the moulds, yeasts, and bacteria occurring on grapes and in fermented liquors; with laboratory work in the purification of yeasts, the testing of varieties of yeasts, and the microscopic examination of fermented beverages.

9 hrs., throughout the year; 6 units. M W F, 1-4.

25. **General Agricultural Technology.** Assistant Professor SHAW.

A general course dealing comprehensively with the chemico-agricultural manufacturing industries of starch, glucose, and cereal preparations; essential and fixed oils and fats; textile and tanning materials, paper making, hop curing, and fertilizer manufacture.

3 hrs., first half-year. M W F, 4.

6. **Sugar Technology.** Assistant Professor SHAW.

A study of practical methods of field, factory, and laboratory management in the manufacture of beet sugar. The lectures aim to give the student a detailed description of the individual processes involved in the manufacture of sugar from both a theoretical and practical standpoint, as well as an understanding of the sugar house as a unit.

2 hrs., second half-year. M W, 4.

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6A. **Sugar-House Control.** Assistant Professor SHAW.

A laboratory course in the analysis of sugar-house products, raw, finished and waste; the analysis of sugar-house supplies, and the accurate calculation of losses. Materials for analysis will be furnished by one of the beet-sugar factories of the State.

6 hr. laboratory; second half-year; 2 units.

9A. **Advanced Laboratory in Plant Pathology.**
Assistant Professor SMITH.

Experimental and laboratory study in plant diseases.

2 or more units, either or both half-years. Hours to be arranged. Open to students properly qualified in Botany and allied subjects, who have taken Course 9.

9D. **Advanced Lectures in Plant Pathology.**
Assistant Professor SMITH.

Intended particularly for students electing Course 9A.

2 hrs., either or both half-years. Time to be arranged.

ENTOMOLOGY.

11A. **Entomology of Linnaeus.** Associate Professor WOODWORTH.

A study of the relation of the Linnaean groups to the modern classification of insects, illustrated by a very complete set of specimens of species known by Linnaeus and his immediate successors.

2 hrs., first half-year. M F, 10.

12. **Advanced Laboratory.**
Associate Professor WOODWORTH and Mr. ———.

Individual instruction in some special problem in entomology. Course 23 must be taken concurrently with this course.

2 or more units, either half-year. M Tu W Th F, 8-4; S, 8-12.

11B. **Mosquitoes.** Mr. ———.

A detailed study of the practical problems of mosquito control.

2 hrs., second half-year. M F, 10.

9B. **Insecticides and Fungicides.** Assistant Professor COLBY.

The composition and compounding of remedies.

1 hr., first half-year. Th, 2.

23. **Laboratory Conference.** Associate Professor WOODWORTH.

A seminary course for the study of topics of current interest in entomology (required of students in Courses 12 and 24).

1 hr., either half-year.

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ANIMAL INDUSTRY.

18A. **Animal Industry: Cattle, Sheep, and Swine.**
Assistant Professor MAJOR.

History, characteristics, and adaptability of the various breeds; principles of breeding; practice in judging.

3 hrs., lectures, M W F, 10. 3 hrs. practice by appointment. 4 units first half-year.

18B. **Animal Industry: Horses.** Assistant Professor MAJOR.

History, characteristics and adaptability of the various breeds; a study of the different market classes and practice work in judging.

2 hrs., lectures, Tu Th, 10. 3 hrs. practice by appointment. 3 units second half-year. Prerequisite: Course 18A.

18C. **Live Stock Management.** Assistant Professor MAJOR.

The housing, feeding, care and management of the various classes of live stock.

2 hrs., lectures, M W, 10. 2 units second half-year. Prerequisite: Course 18A.

19. **Dairy Husbandry.** Assistant Professor MAJOR.

A study of milk and the manufacture of milk products.

1 hr. lecture, Th, 10; 6 hrs. practice by appointment. 3 units, first half-year.

20. **Chemistry of Dairying.** Assistant Professor JAFFA.

Lectures. 2 hrs., first half-year. Tu Th, 1.

20A. **Laboratory Course.** Assistant Professor JAFFA.

Analysis of milk and dairy products, and detection of adulterants.

6 hrs., first half-year; 2 units. Prerequisite: Chemistry 4 and 5B.

NUTRITION.

3A. **Principles of Nutrition.** Assistant Professor JAFFA.

Discussions of the functions of nutrients and the theories of digestion.

1 hr., first half-year. S, 9.

3B. **Feeds and Feeding.** Assistant Professor JAFFA.

Lectures on cattle foods. Practical application of the principles of nutrition to the rational feeding of farm animals.

2 hrs., second half-year. Tu Th, 1.

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3C. **Composition and Use of Human Foods: Food Adulteration.**
Assistant Professor JAFFA.

Lectures.

1 hr., second half-year. S, 9. (For laboratory work in this subject, see Course 3D.)

3D. **Laboratory Course.** Assistant Professor JAFFA.

Analysis of human and cattle foods, and detection of adulterants.

6 hrs., second half-year. 2 units. Tu Th, 2-5. Prerequisite: Chemistry 4 and 5B.

VETERINARY SANITARY SCIENCE.

10C. **Veterinary Sanitary Science.** Dr. HARING.

A general course dealing with the infectious diseases of domestic animals, their recognition and control.

2 units, second half-year. Lectures and recitations, Tu Th, 9.

26. **Thesis for B.S. Degree in Agriculture.**

GRADUATE COURSES.

17. **Soil Areas and Soil Distribution in California.**
Assistant Professor LOUGHRIDGE.

Lectures, with photographs and lantern-slide illustrations of topographical features of the State.

1 hr., second half-year. W, 11. Prerequisite: Courses 1A and 1B.

22. **Laboratory Research in Agricultural Chemistry.**
Assistant Professors JAFFA, COLBY, and SHAW.

21. **Advanced Instruction in Horticulture.** Professor WICKSON.

Advanced Instruction in Viticulture.
Assistant Professor BIOLETTI.

Study of special problems. Prerequisite: Course 5D.

Advanced Instruction in Zymology. Mr. TWIGHT.

24. **Research Work.** Associate Professor WOODWORTH.

Individual investigation under the direct supervision of the instructor, but not necessarily at Berkeley nor during the term. Credit will be given only on the basis of work ready for publication.

Course 23 must be taken concurrently with this course.

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3E. **Special Research in Animal Nutrition.**

Assistant Professor JAFFA.

Advanced course.

1 hr. lectures; 6 hrs. laboratory work; 3 units, second half-year.

SPECIAL DAIRY COURSE.

This course consists of practical work in making butter and cheese, testing milk for fat and adulterations, and operating dairy machinery, supplemented by lectures and recitations treating of the principles involved in modern dairy practice.

The dairy course is open to all persons of good moral character who are at least seventeen years of age and who have a common-school education. No formal entrance examinations are required, but it is expected that all applicants will have had sufficient school training to enable them intelligently to understand lectures, take notes, and perform the necessary text-book work. The usual grammar school course gives a fair preparation for this work, although the better the previous education of the student the greater will be the benefit to be derived from the instruction given.

SHORT COURSE IN AGRICULTURE AND HORTICULTURE.

Given at the same time as the above Special Dairy Course. A special announcement will be issued in August giving detailed information.

COURSES IN OTHER DEPARTMENTS.

Irrigation Institutions and Economics. [See Irrigation 1.]

Professor MEAD.

The Diversion, Conveyance and Application of Water. [See Irrigation 2.]

The Conservation of the Water Supplies. [See Irrigation 3.]

Economic Botany. [See Botany 14.] Mr. H. M. HALL.

Commercial and Agricultural Botany. [See Botany 15.]

Mr. H. M. HALL.

Weeds, Seeds, and Seed-Testing. [See Botany 16.]

Mr. H. M. HALL.

Advanced Economic Botany. [See Botany 28.]

Mr. H. M. HALL.

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MILITARY SCIENCE AND TACTICS.

JOHN T. NANCE, Captain Ninth Cavalry, U. S. Army, Graduate U. S. Military Academy, Professor of Military Science and Tactics.

WALTER E. MAGEE, Director and Professor of Physical Culture.

The hours for the exercises in Military Science and Tactics will be announced in the Schedule of Exercises for 1905-06.

1A. **Practical Course.** Professor NANCE.

Covering the following subjects:

Infantry Drill Regulations, through the school of the battalion in close and extended order.

Advance and rear guards, and outposts.

Marches.

The ceremonies of battalion review, inspection, parades, guard mounting, and escort of the colors.

Infantry target practice.

Instruction in first aid to the injured.

Instruction in the posting and relief of sentinels and their duties.

1B. **Practical Course.** Professor NANCE.

Continuation of Course 1A.

2A. **Theoretical Course.**

Professor NANCE and Cadet Commissioned Officer.

The Infantry Drill Regulations covered by the practical instruction.

The Manual of Guard Duty.

2B. **Theoretical Course.** Professor NANCE.

Small Arms Firing Regulations, Parts I, II, and VII.

The Articles of War, with special reference to Articles 4, 8, 15, 20, 21, 22, 23, 24, 32, 38, 39, 40, 42, 44, 46, 47, 50, 55, 57, 61, and 65.

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And the following records:

Enlistment and discharge papers, including descriptive lists.
Morning reports.
Field and monthly returns.
Muster rolls.
Rosters.
Ration returns.
Requisitions.
Property returns.

The articles of war specifically mentioned are among the most important for the young officer to know on first entering the service.

The records prescribed for study should be thoroughly understood by all graduating cadets, because they show how the soldier enters and leaves the service, how he is accounted for, paid, fed, clothed, armed, and how his military duties are regulated.

Ten lectures each year upon the following subjects, notes to be taken by the students and to be made the basis of subsequent recitations or examinations.

Two lectures on the organization of the United States Army, including volunteers and militia.
One lecture on patrols and outposts.
One lecture on marches.
One lecture on camps and camp hygiene.
Three lectures on lines and bases of operations.
Two lectures on the attack and defense of advance and rear guards and outposts and convoys.
All of the foregoing to be illustrated by historical examples.

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PHYSICAL CULTURE.

WALTER E. MAGEE, Director and Professor of Physical Culture.

GENEVRA E. MAGEE, Assistant in Physical Culture.

LOUISA A. PLACE, Assistant in Physical Culture.

JAMES W. RHODES, Assistant in Physical Culture.

GEBHARD H. PFUND, Assistant in Physical Culture.

Each male student is examined from time to time, with reference to his health and physical development, and appropriate exercises are prescribed. These exercises are conducted in classes, so far as is practicable; but in many cases individual instruction is given. A supervision of student athletics is exercised by the Department. The expenses for each student are: Four to five dollars for a regulation suit, which consists of one pair of navy blue full tights, one white cotton or woolen shirt, one pair navy blue trunks, one supporter, and one pair rubber-soled shoes.

The Hearst Gymnasium and Court are reserved for the exclusive use of young women. The young women are examined with reference to their health and general physical condition. To those found unable to do class work, special instruction is given, and exercises adapted as nearly as possible to individual needs are prescribed. In suitable weather classes are conducted in the outdoor Court. The expenses are: From four to five dollars for a regulation suit.

Beginning in August, 1905, **all undergraduate students** will be charged an annual fee of three dollars, in return for which the University will supply to each student locker and towels at the Gymnasiums. This is to be payable at the time of registration in August.

LOWER DIVISION COURSES.

1. **Course for Men.** Professor MAGEE, Mr. RHODES and Mr. PFUND.

Exercises without apparatus; the developing appliances; chest-weights, dumb-bells, bar-bells, and Indian clubs. Exercises in walking and running; mat exercises; vaulting-horse, parallel bars, rings, and horizontal bars.

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4 hrs., throughout the year; 1 unit each half-year. Two sections. M Tu W Th, 4, 5. Prescribed to all men undergraduates during the first year of their attendance at the University.

1A. **Advanced Course.** Professor MAGEE and Mr. PFUND.

Exercises with parallel bars, vaulting horse, horizontal bar. The principles of wrestling. The saber, single-stick, and foil.

4 hrs., throughout the year; 1 unit each half-year. M Tu W Th, 2. Prerequisite: Course 1.

1B. **Corrective Exercises.** Mr. RHODES.

Exercises adapted to students unable to take part in class work. Mat exercises, the developing appliances, and breathing exercises.

2 hrs., throughout the year; ½ unit each half-year. M W, 11.

2. **Course for Women.**

Professor MAGEE, Mrs. MAGEE, and Miss PLACE.

Exercises without apparatus; breathing exercises; the developing appliances; relaxing exercises, walking, running, and mat exercises; chest-weights, dumb-bells, bar-bells, Indian clubs, stall bars, Swedish boms, rings. Recreative exercises.

4 hrs., throughout the year; 1 unit each half-year. Two sections. M Tu W Th, 3; 4. Prescribed to all women undergraduates during the first year of their attendance at the University.

2C. **Advanced Course for Women.** Professor MAGEE.

Advanced exercises with chest-weights, Swedish boms, stall bars, ladders, and rings.

2 hrs., ½ unit each half-year. M W, 2. Prerequisite: Course 2.

2D. **Corrective Exercises.** Mrs. MAGEE and Miss PLACE.

Exercises adapted to students unable to take part in class work. Mat exercises, the developing appliances, and breathing exercises.

4 hrs., throughout the year; 1 unit each half-year. M T W Th, 2.

UPPER DIVISION COURSES.

3. **History of Physical Culture.** Professor MAGEE.

The gymnastic training in ancient Greece; modern training in Sweden, Germany and England; physical training in the United States, and its further development.

1 hr., first half-year; 1 unit. M, 1.

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4. **Anthropometry.** Professor MAGEE.

History of Anthropometry; Greek standards, modern art proportions, description of modern instruments, charts; the technique of measurements; items and rules of the American Association for the Advancement of Physical Education.

1 hr., second half-year; 1 unit. M, 1. Prerequisite: First half-year of Course 7.

5. **Physical Examinations.** Professor MAGEE.

Methods of measuring, including photography; testing and examining individuals, to note variations from the normal and to ascertain their fitness for particular exercises.

1 hr., second half-year; 1 unit. W, 1. Prerequisite: First half-year of Course 7.

*6. **Exercises Adapted to Public Schools.** Professor MAGEE.

Lectures and recitations. Breathing exercises; the proper manner of sitting, standing, walking, running; free movements, figure marching, light gymnastics with dumb-bells, bar-bells, wands, Indian clubs; exercises without apparatus, chest-weights, mat exercises; elementary exercises on vaulting horse, parallel bars, horizontal bar; care of apparatus; recreative games.

2 hrs., first half-year; 1 hr., second half-year; 3 units. Tu Th, first half-year; Th, second half-year. Prerequisite: For men, Course 1; for women, Course 2.

7. **Anatomy: Its Relation to Physical Culture.**

Professor MAGEE.

1 hr., first half-year; 1 unit. W, 1.

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*NOTE.—The Department will, in general, recommend as qualified to teach Physical Culture only such graduates as have passed with credit Courses 2c, 3, 4, 5, 6, and 7, and Hygiene 2.

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REGISTRATION.

To the Student. In making up your list of courses, consult this ANNOUNCEMENT OF COURSES and such supplementary announcements as may have been issued; consult, also, the SCHEDULE OF EXERCISES. In all cases in which the SCHEDULE differs from the ANNOUNCEMENT as to the hours at which classes are to meet, the SCHEDULE should be followed. Give the exact name and number of each course, following in each case the latest announcement. Freshmen should confer with their advisers regarding plans of study.

(For the requirements for the several degrees, see the University REGISTER.)

REGULATIONS GOVERNING CHOICE OF STUDIES.

1. Regular Students in the *Colleges of Letters*, *Social Sciences*, *Natural Sciences*, and *Commerce* are not expected to take more than sixteen units a week during any half-year. In the first half of the Freshman year they may take not more than nineteen units a week, provided they have no entrance deficiencies; and after the first half of the Freshman year, they may take nineteen units a week during any half-year, provided they have no entrance deficiencies and no deficiencies in University work. But students in Letters, Social Sciences and Natural Sciences following the *revised curricula* of these colleges are limited to sixteen units per half-year in the Upper Division of the undergraduate course.

2. In the *Colleges of Agriculture*, *Mechanics*, *Mining*, *Civil Engineering*, and *Chemistry* there is a certain minimum of studies prescribed. Regular students of these colleges may take not more than nineteen units a week on complying with the conditions specified in ¶ 1, above.

3. A regular student may be required or allowed to take a smaller amount of work than the minimum stated above.

4. Special Students have free election, subject to the requirement that they confine their attention to some special study and its related branches. The study-list of every Special Student must be approved, before filing with the Recorder, by the student's Adviser. During their first half-year at the University they may take not more than nineteen units a week; and after the first half-year they may take nineteen units a week, provided they have incurred no deficiencies.

5. Limited Students have all their studies elective, but they are limited to thirteen units a week.

6. Any student having a deficiency—whether it be an entrance or a college deficiency—remaining unremoved for more than one year, will be restricted in his choice of studies to thirteen units a week until the deficiency shall have been removed.

7. All able-bodied male Undergraduates, including Special Students, are required to take military exercises; [the hours for 1905-06 will be announced in the Schedule of Exercises]; and all Undergraduates, including Special Students, are required to devote to physical culture five exercises a week during their first year's residence at the University. Students who are taking the prescribed work in Physical Culture, two units a half-year, may increase the maxima stated above (13 units, 16 units, or 19 units) by two units in each case (making 15, 18, or 21).

8. No student will be permitted to enter upon the study of any subject if the officer of instruction in charge of that subject is satisfied that by reason of lack of preparation he is not competent to undertake it. This rule takes precedence of all others.

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